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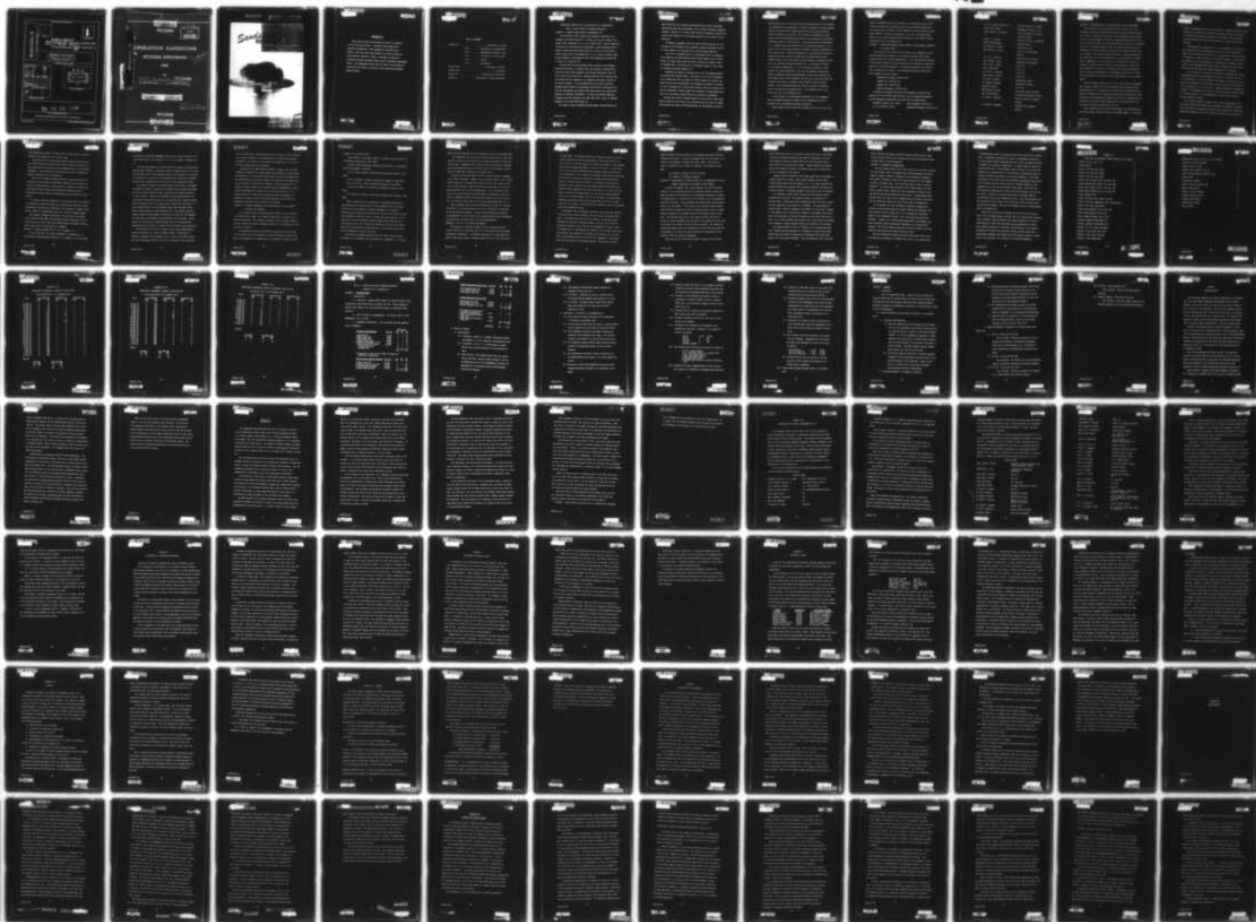
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Annex I Part II Volume I

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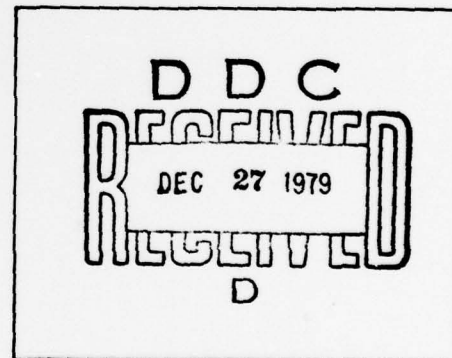
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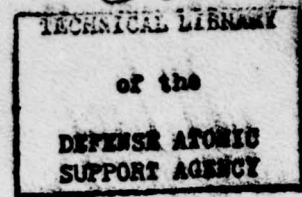
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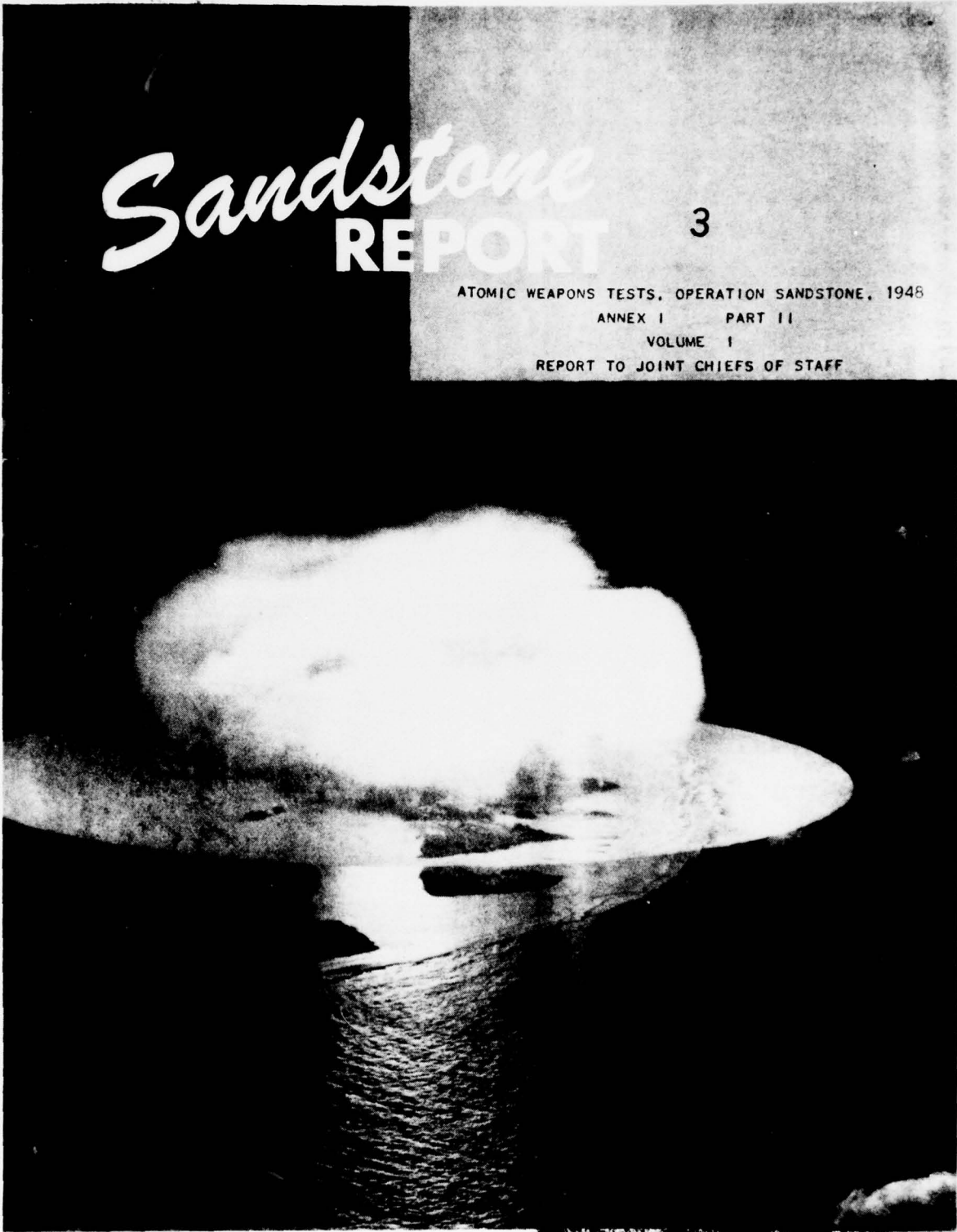
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ATOMIC WEAPONS TESTS, OPERATION SANDSTONE, 1948

ANNEX I PART II

VOLUME I

REPORT TO JOINT CHIEFS OF STAFF



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INTRODUCTION

This annex contains the operational reports of agencies of Joint Task Force Seven. In general these reports are complete as submitted to the Commander of the Task Force. However, there have been some deletions in order to keep the classification "secret" or lower, to obviate an excess of duplication between different reports and to eliminate unnecessary detail. The unabridged reports will be found in the records of Joint Task Force Seven, in custody of the Armed Forces Special Weapons Project.

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OPERATIONAL REPORT OF TG 7.2 ACTIVITIES UP TO EMBARKATION

PART 1, 2d ESB HISTORY (Operation Sandstone)

CHAPTER 1 - GENERAL OGDEN CALLED TO WASHINGTON, D.C.

The 2d ESB was first brought into Operation "Sandstone" by a telephone call from Colonel D. H. Tulley, CE, from the office of Lt. General Hull, Washington, D. C., on 9 October 1947. General Ogden was instructed to bring with him to Washington a small planning staff to attend a conference with General Hull on or about 15 October 1947. General Ogden chose to accompany him, Lt. Col. Henry M. Salley, Regimental Commander, 532d Engineer Boat & Shore Regiment and Major Rex K. Shaul, S-3, 532d EB & SR.

General Ogden and his planning staff arrived at the Pentagon, Wednesday afternoon, 15 October 1947, and reported to General Hull, Joint Task Force Seven Commander, and General Ferenbaugh, Chief of Staff of the Joint Task Force. General Ogden was then informed that the 2d ESB would be assigned to an engineer construction project in the Pacific theater. It was decided that the 2d ESB's personnel strength would consist of forty-three (43) Officers and Warrant Officers and five-hundred and twenty (520) Enlisted Men for construction incident to Operation "Sandstone". At this time General Ogden was designated as Atoll Commander for Joint Task Force 7 and, in addition, Commander of the Army Task Group 7.2.

For three (3) days following, General Ogden, Colonel Salley and

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Major Shaul met and conferred with General Hull's staff discussing preliminary plans for the movement of the 2d ESB to Eniwetok, Marshall Islands. Colonel D. H. Tulley, Joint Task Force Engineer, outlined the project and assigned the construction missions of the 2d ESB in this operation.

Preliminary equipment lists were made up which included T/O & E equipment of the Brigade and, in addition, special equipment peculiar to this project to be procured by the various supply agencies.

This list of equipment had to be coordinated with the equipment being taken by the 18th Engineer Construction Company, part of Task Group 7.2, which would depart from Oahu, Territory of Hawaii, about 15 November 1947. The final list of equipment brought by the 2d ESB is attached and marked Appendix "A".

Permission was given to include on the list of equipment DUKW's, for passage over shallow reefs. Also added to the list of equipment to be shipped were two L-4 planes of 2d ESB Liaison Air Section, for rapid inter-island transportation and emergency evacuation of injured or sick on islands ten to twenty miles distant from the hospital to be set up at Eniwetok. General Ogden also requested a running small boat pool for inter-island transportation of personnel and equipment.

Working from present strength figures of the 2d ESB at that time, General Ogden and staff came to the conclusion that in order to obtain five-hundred and twenty (520) Enlisted Men for the mission, and still

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maintain the post at Fort Worden with the remaining units of the Brigade not committed for the operation, it would be necessary to recall approximately one hundred (100) Brigade personnel from the various Service Schools throughout the country. This request was submitted to Army Ground Forces and permission was granted on the strength that Operation "Sandstone" was of a high priority. During this meeting in Washington, D. C., General Ogden was informed that a Provisional Battalion, to be part of TG 7.2, was being organized in Hawaii. General organization of this battalion was: Battalion Headquarters, 18th Engineer Construction Company and several supply, housekeeping and administrative cells. Complete lists of units and cells of this battalion, as planned at this time, are attached and marked Appendix "B". As outlined by Colonel D. H. Tulley in Washington, D. C., the Provisional Battalion would maintain the shore-based units, with the 18th Engineer Construction Company completely rehabilitating Eniwetok Island, thus relieving the 532d Engineer Boat & Shore Regiment from any other functions except the priority construction on Engebi, Aomon, Biijiri, Runit and Parry Islands. This Provisional Battalion was due to arrive at Eniwetok Atoll the early part of December 1947. The 2d ESB was given a tentative port call of 10 December 1947.

It was decided at the Washington Conference that the equipment would be shipped through the Seattle Port of Embarkation and the personnel thru the NABD Port Hueneme, California.

General Ogden and his staff were instructed that, due to the "Top

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Secret" classification of this operation, "Q" clearances for all individuals engaged in the planning phase would be initiated immediately upon return to Fort Worden. At the completion of the conference General Ogden decided to remain in Washington, D. C., for a few days longer while Lt. Col. Salley and Major Shaul returned to Fort Worden to begin preparations for the intended move.

CHAPTER 2 - ACTION UPON GENERAL OGDEN'S RETURN TO FORT WORDEN, SELECTION OF SPECIAL STAFF.

Upon arrival of the staff at Fort Worden, unit commanders and key staff personnel were briefed on the proposed operation after being properly warned of its high classification. All concerned were directed to focus their attention and concentrate their activities to prepare the units for an overseas movement on a construction project, the duration not to exceed six (6) months. The following reinforced 2d ESB units were committed for this project:

Headquarters Company, 532d EB & SR.

Company "D", 532d EB & SR.

Company "E", 532d EB & SR.

Medical Detachment, 532d EB & SR.

Included with Brigade units there was organized a special staff composed of the following named Officers from the Brigade Headquarters and the Regimental Headquarters who would form the ISCOM Staff:

Brigadier General D.A.D. Ogden

Atoll Commander and CTG 7.2

Lt. Col. Henry M. Salley

Regimental Commander, 532d EB & SR

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Lt. Col. James E. Harper, Jr.

Major Rex K. Shaul

Major Thomas J. Osekowski

Major J. D. Kelsay

Major Bert DeMelker

Lt. Rolland A. Lozeau

WOJG Walter F. Hopkins

Lt. John J. Rafferty

Capt. Erwin O. Jung

Capt. Peter H. Wolfe

Capt. Joseph Whol

Lt. Louis A. Jennings

Capt. David C. Morrow

Lt. John J. Kentzel

Lt. Eugene C. Murphy

CWO Roy W. Ligon

WOJG Thomas B. Black

Capt. Newo Petrini

Lt. Anton F. Vaitonis

Lt. George R. Lightkep

Liaison Officer for 2d RSB

Operations Officer, TG 7.2

Ass't Operations and Intel-
ligence Officer

Executive Officer, 532d EB&SR

Supply Officer

Adjutant and S-1

Ass't S-1 and Personnel
Officer

Special Service Officer

Headquarters Commandant

Ass't S-4

Ass't S-3

Ass't S-3

Ass't S-3

Embarkation Officer

Embarkation Officer

Ass't S-4

Top Secret Control Officer

Equipment Maintenance Officer

Liaison Pilot, OIC Liaison
Section

Liaison Pilot, Engineer
Officer

Section VI-a

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CHAPTER 3 - REORGANIZATION OF 532D ENGINEER BOAT & SHORE REGIMENT

The personnel problem immediately became a major one. Unit commanders screened their personnel and the Personnel Officer alerted his section to search all Forms 20's for the necessary qualifications and MOS's in the Regiment. However, it appeared obvious, due to the lack of skilled key men, that MOS qualifications would not be considered but only the necessary service time. The results of this were not favorable, since only sixty-five percent of the required number (520) were eligible. The greatest setback was due to a large percentage of the personnel due to be discharged from the service prior to 30 June 1948. Appendages C-1, C-2, C-3 and C-4, indicates the turnover of personnel during the time of alert to the embarkation. During this period Company "E" had five (5) Officers and one hundred sixty-five (165) enlisted men transferred to the Company, while one (1) Officer and sixty-eight (68) enlisted men were transferred out of the organization.

Over-all changes affecting each of the units within the Regiment were drastic, inasmuch as the line companies were re-inforced from approximately four (4) Officers and one hundred (100) enlisted men to eight (8) Officers and two hundred and three (203) enlisted men, while Headquarters and Headquarters Company was reduced in strength from one hundred and forty-eight (148) enlisted men to ninety-four (94) and increased in Officer strength from 22 to 23.

After exhausting local sources (Fort Worden) for additional men, there lacked about 100 EM to meet the prescribed number. Lt. Colonel

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Robert F. Alexander, Deputy Brigade Commander, 2d ESB, visited 6th Army Headquarters, presented this personnel problem in hopes of obtaining the needed EM to bring the Brigade up to strength. Since 6th Army strength figures were lower than authorized, no additional men were obtained.

JTF Headquarters, Washington, D. C., was immediately notified of this situation with recommendations that the 2d ESB be permitted to extend certain expiring enlistments to 1 August 1948. This would allow the Brigade to commit 520 EM for the overseas movement. This request was granted and the authorization to extend these enlistments was contained in War Department TWX 89856, dated 6 November 1947 and Secret TWX Sixth Army AM GAP-D-1115, dated 8 November 1947, messages.

It was decided to increase the strength of the Medical Detachment, 532d Engineer Boat & Shore Regiment from three (3) Officers and six (6) enlisted men, to five (5) Officers and twenty (20) enlisted men to meet the requirements of establishing and maintaining a field hospital on the principal island of the atoll. Captain Veenschoten, Commanding Officer of the Medical Unit, however, also kept in mind a flexible plan to operate dependent or sub-dispensaries to provide first-aid and medical attention locally.

The personnel problem continued to be a prime requirement; after the local sources (Fort Worden) were exhausted, the Medical Detachment still lacked two (2) Officers and eleven (11) enlisted men to meet the prescribed strength of five (5) Officers and twenty (20) enlisted men.

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Based on the paucity of information at this time, a requisition for qualified medical personnel was submitted to Sixth Army Headquarters, not particularly for specified MOS's but for the necessary service men to man the hospital and dispensaries. Captain Veenschoten felt that he already had the key men for his mission.

Considerable thought was given to the supply and re-supply problems. An initial supply for the field hospital for ninety (90) days and in addition, an initial supply for servicing two thousand (2000) men was forwarded to Sixth Army Headquarters, on or about 8 November 1947, covering only the expendable items needed. Requisitioning of certain essential non-expendable items was left unanswered until a telephone call to JTF Headquarters, Washington, D. C., cleared up this matter with the assurance that the fifty (50) bed hospital was complete, except for one item, a refrigerator. This was procured locally and shipped with the Medical equipment from Fort Worden.

The required immunizations for Operation "Sandstone" were smallpox vaccination, typhoid and tetanus inoculations, completed on 20 November 1947 for all personnel with the exception of a few stragglers, and an accurate account of the entire group on 11 December 1947.

All Medical Detachment TO/E, special equipment were crated, and boxed and ready for shipment on 20 November 1947.

CHAPTER 4 - SUPPLY AND PROCUREMENT

The planning staff returned from the Washington conference with a list of deletions and additions to the 2d ESB TO/E, insofar as major

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items were concerned. The first modification recommended further deletions, items peculiar to boat operation for which no need existed in the construction mission assigned.

Additions consisted of office equipment, furniture, radios, and navigation equipment. Radios and signal equipment were included because at that time it was assumed that the small boats would be under Brigade control. This particular signal equipment was TO/E for the boat companies of the 2d ESB, not committed for operation "Sandstone"; another change was the substitution of a medium sedan instead of a light one.

Immediately upon receipt of movement directed, Major Glen F. Brooks, Post QM, Fort Worden, Washington, departed for Ogden General Depot, Ogden, Utah, as liaison officer to expedite procurement of the equipment and supplies required. Requisitions for tropical clothing on tariff sizes based on needs of six hundred and fifty (650) personnel were submitted. All unit commanders at this time were faced with the peculiar problem of predicting as near as possible the correct sizes in khaki clothing for the proposed strength of their unit, even though some of the units were only up to fifty (50) percent strength at the time they were required to submit requisitions.

Requisitions for clothing and non-expendables from Utah QM Depot were readily filled, but the expendables required last-minute shipments by commercial carriers, some of these arriving just before the USS Yancey sailed.

Lt. Col. Matthews and Captain Brotherton, both from G-4, Sixth

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Army Headquarters arrived at Fort Worden, October 1947, to assist in preparing the Brigade for the overseas move.

Requisitions for the necessary engineer supply and spare parts were filled from unit stocks at Fort Worden, with the exception of a few items which were obtained from the Engineer Depot at Fort Lewis, Washington. This included the spare parts for five (5) additional graders, authorized for this mission.

Since the Mt. Ranier Ordnance Depot was located near-by daily contact with this agency was afforded, resulting in good service in supply of available parts. Spare parts not available at Ranier Ordnance Depot required numerous long distance telephone calls to Letterkenny Ordnance Depot in Pennsylvania and air shipment of these parts.

All signal items were available at Fort Worden with the exception of expendables, batteries, tubes, etc., which were delivered on time. Considerable difficulty was experienced in procuring TC supplies from depots, however, a substantial stock was on hand in Brigade supply.

The Engineer equipment authorized, over and above the Brigade TO/E, routed through NABD, Port Hueneme, arrived sporadically but on time; the last of these items were loaded aboard the Marshall Victory which sailed four (4) days after the Pickaway.

CHAPTER 5 - LIAISON OFFICER, 2d E. S. B., IN OAHU, T. H.

At the Joint Task Force Seven conference in Washington, D. C., 15-20 October 1947 Brigadier General D. A. D. Ogden, C. G. of the Army

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Task Group for Operation SANDSTONE, named as his liaison officer to the (then) JTF-7 FWD at Fort Shafter, T. H., Lt. Col. James E. Harper, Jr., CE.

At Fairfield-Suisun on 31 October 1947 Col. Harper in company with General Ogden attended a conference called by General Hull on his return from Eniwetok, with a reconnaissance party, and information on condition of buildings and utilities on the Eniwetok Atoll islands was furnished together with a description of the scope of the construction tasks.

Col. Harper forwarded to General Ogden at Fort Worden, Washington, information obtained on supplies and equipment being shipped from Army, Air Force and Navy stocks in Oahu, going thru the shipping manifests for this purpose. Plans for the Eniwetok Island rehabilitation and information on the Navy contracts for constructing the causeway between Aomon and Biijiri and for the lagoon photo towers were also given. It was recommended that the 532d Engineer Boat & Shore Regiment bring along portable pumps and flood lighting sets. The amount of Special Service supplies being shipped from Oahu and the need for the Regiment to bring along a good Special Service Officer were indicated. Information on the fact that a Finance Officer was to be furnished and instructions on how we were to handle IG and JA matters were mentioned.

After arrival at the site a review of the actual rehabilitation task was furnished in a letter to General Ogden. Information on supplies, carpenter shop equipment, etc., on hand and in China stocks were also furnished, together with data on condition of the tank farm

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and the reefer bank. Reconnaissance was also made of the Zero Islands and a report furnished on the facilities and conditions prevailing. Estimates on the scope of the concrete and asphalt work to be done on the Zero Islands were also forwarded.

Assistance was rendered Major William J. Hussey, CAC, the Atoll Commander at Eniwetok, on supply matters and problems of coordinations involving the U. S. troop units which began arriving 24 December 1947, and requisitions on Oahu were submitted for materials and supplies not already received or destined for shipment. While the matter of furnishing a liaison officer is in itself useful and worthwhile, it will likely be worthwhile in future tests to send out from the U. S. an advance supply and construction planning team for the purposes of adapting the tasks at hand to the best advantage of the troops and equipment being sent from the Zone of the Interior.

CHAPTER 6 - LIAISON DETACHMENT, 532D ENGINEER BOAT & SHORE REGIMENT

AT NABD, PORT HUENEME.

On 18 November 1947, 6th Army directed 2d ESB to have 5 Officers and 2 EM proceed to NABD, Port Hueneme, California, to function as a liaison detachment. This liaison detachment would coordinate Administration, Supply and Medical problems incident to the embarkation of the 2d ESB for overseas.

The following Officers and Enlisted Men representing the 2d ESB for the liaison duty were alerted to discuss anticipated problems with their Unit Commanders and instructed to be prepared to depart for Port

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Hueneme on 21 November 1947:

Major Thomas J. Osekowski, Officer in Charge, Liaison Detachment,
representing Headquarters, 532d EB&SR

Captain Girard Veenschoten, Medical Representative, representing
Medical Detachment, 532d EB&SR

1st Lt. Ralph R. McGaw, representing Headquarters Company, 532d
EB&SR

1st Lt. Clarence S. Warman, representing Company D, 532d EB&SR

2nd Lt. Morris W. Head, representing Company E, 532d EB&SR

T/5 Cecil R. Hamers, Clerk Typist, Headquarters Company, 532d
EB&SR

Pfc Fredrick H. Wiseman, Clerk Typist, Headquarters Company, 532d
EB&SR

Before departing for Port Hueneme all anticipated difficulties
and problems were discussed; the two most important were the timely
arrival of the odd pieces of engineer equipment to be loaded at
Hueneme and the housing of the 2d ESB for the short time until the ship
was completely loaded and ready to receive the troops aboard. It was
agreed that close coordination would be imperative between 2d ESB,
Transportation Corps and the Navy at Hueneme to have the troop trains
arrive on the same day the ship would sail, thus obviating the neces-
sity of housing the troops at the Port.

The liaison detachment departed from Ault Field, Whioby Island,
Washington, on 21 November 1947 and reported to Commander K. C. Lovell,

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NABD, Operations Director at Port Hueneme for duty on 24 November 1947.

The possibility of having the 2d ESB troops arrive at a time when cargo was loaded and the ship ready to receive personnel was the first request made. Commander Lovell informed Major Osekowski that embarkation was planned direct from the troop trains on 14 December, one day before the APA 222, "Pickaway", was ready to sail.

Inquiry was then made about the list of extra Engineer equipment to be loaded at Hueneme: namely, four (4) cement mixers, one (1) paver, crawler type, two (2) sheeps-foot rollers, two (2) disc harrows, four (4) ice cream machines, fifty (50) tons of pierced plank, four (4) ice making machines and ten (10) refrigerators. As of 24 November 1947, none of the items mentioned were delivered, but immediate steps were taken by Commander Lovell by alerting all concerned to be on the lookout, not only for these items, but for all items marked 9584 A to G.

Major Osekowski then contacted Captain Glen E. Cave, TC, Oakland, California P of E representative, who was to officiate the unloading of the personnel at Hueneme. A report by long distance was made to the Headquarters at Fort Worden that liaison relations were established at Hueneme with the Navy and the P of E representative.

CHAPTER 7 - 2D E. S. B. LIAISON AIR SECTION

The Liaison Air Section, 2d ESB, was first notified about 20 October 1947 that it would take two (2) of its planes with the Brigade on Operation "Sandstone". No definite decision as to type planes was made at this time; however, tentative plans for one (1) L-4 and one (1)

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L-5 were made. The Liaison Section was alerted to prepare a six (6) months' supply of parts for these planes. Parts lists for one (1) L-4 and one (1) L-5 were made up, but about 17 November it was decided, due to parts resupply problems, to take two (2) L-4's. At this time one of the L-4's had officially been declared surplus and the other was being prepared to be turned in as surplus. Sixth Army had declared all L-4's in ZI surplus, which posed a problem since Air Material Depots no longer stocked L-4 parts. Lt. Vaitonis, Liaison Section Commander, made a search for the necessary parts at Fort Lewis and McChord Field, Washington, and could only find two (2) tires, two (2) tubes, forty-two (42) spark plugs, one (1) sheet of plexi glass 48" x 36", one (1) brake segment and one (1) tail wheel. On hand before embarking, the Liaison Section had enough spare parts for one major overhaul on one engine. No authority was received to procure the needed parts from commercial stocks.

Both planes were in excellent condition, one having only fifteen (15) hours since a major overhaul, the other about one hundred (100) hours. The fourth Air Depot Unit was contacted to have the planes prepared and crated for overseas shipment, but, due to the lack of necessary facilities, this could not be accomplished in time. After consulting with Lt. Vaitonis and Lt. Ritchie it was decided, that since both officers had experience in packing and crating L-4's, to do the work at Fort Worden with the aid of the Post Carpenters. The planes were flown and landed on the parade grounds. The planes were then

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taxied through the post streets to the carpenter shop where they were processed and crated. On about 18 November 1947, the two pilots to be a part of the General's special staff were chosen: They were Lt. Anton F. Vaitonis and Lt. George R. Lightkep. The mechanics chosen were:

Tec 4 Merle P. Welling, Chief of Section

Tec 5 Melvin H. Granberg, Mechanic

CHAPTER 8 - ORGANIZATION OF BRANCH SEATTLE PORT OF EMBARKATION AT FORT WORDEN, OUTLOADING OF EQUIPMENT AT FORT WORDEN.

On about 20 November 1947, Captain Kephart, TC, Water Division, Seattle P of E and Captain Usher, TC, Commanding Officer, 447th Port Company arrived at Fort Worden for a preliminary conference concerning the organization of a branch port at Fort Worden for the outloading of the AKA 93 "Yancey". Captain Kephart and Captain Usher met with Major Shaul, S-3, 532d EB&SR. It was decided that the AKA 93 would anchor about 300 yards off-shore and flat top barges would be used for lightering the supplies and equipment from the Fort Worden docks to ship side. Two problems arose out of this plan; first was the task of loading the heavy equipment from the dock to the barges; the second was the moving of the barges from the docks to the ship. The problem of lifting was easily solved by utilizing the 2d ESB's floating crane (30 ton capacity), the second was also solved by the utilization of the Brigade's LCM's as tugs and lighterage.

Plans were made to move Captain Usher's Company to Fort Worden

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about three days prior to the arrival of the AKA 93 and to have them include the necessary stevedore from Seattle, Washington, by tug to Port Townsend, where the Brigade LCM's took over and moved them to Point Hudson to be moored until needed. Captain Kephart and Captain Usher then returned to Seattle to complete plans and the paper work for the outloading of the Yancey.

Captain Kephart returned to Fort Worden again about 27 November to inspect packing and crating. With Captain Kephart was Mr. Brown, civilian super-cargo from the Seattle P of E. Mr. Brown inspected the loaded vehicles and conferred with Lieutenants Kentzel and Murphy concerning logistics of Engineer equipment with which he was not familiar.

On 2 December, Captain Usher arrived with his company and was billeted near the docks. The barges arrived on the morning of 3 December 1947. Loading was started immediately upon the ship's arrival and was completed on the morning of 9 December. The experiences of Captain John J. Huetter, Company B, 532d EB&SR, Lt. John Power, Company B, 532d EB&SR, and Lt. Harry Prock, Company D, 532d EB&SR, were invaluable in the operation of moving the barges back and forth from dock to ship. One of these officers was present at all times during the loading and no mishaps or delays happened during the movements of the barges.

The advance detail of nine (9) Officers and one hundred and nine (109) enlisted men were embarked on 9 December at 1300 and the Yancey sailed from Fort Worden the morning of 10 December 1947, three days ahead of the anticipated deadline. This was fortunate, due to the fact

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that on the day the Yancey sailed the weather, which had been ideal during loading, broke, and no loading could have been performed during the week after the Yancey departed.

CHAPTER 9 - DEPARTURE AND EMBARKATION

Two bus convoys, eight in the first and six in the second, departed from Fort Worden, 0900, 12 December 1947, with Headquarters and Headquarters Company, Company D, Company E, and the Medical Detachment, 532d EB&SR, for Seattle, where the troops entrained for Port Hueneme at 1300, 12 December 1947. Two trains were used to move the entire Regiment. The second train arrived at Port Hueneme before the first train, causing a minor problem since the Commander of Troops and the records had been placed aboard the first train. No appreciable delay resulted since the roster of the organization was divided in two parts and the troops were aboard the train in the order of embarkation.

On 14 December, all the odd pieces of Engineer equipment had arrived and were loaded aboard the Yancey, Warrick and Pickaway, with the exception of two or three 26 cu. ft. refrigerators which were booked for the "Marshall Victory", due to sail four days after the Pickaway. Loading out of these items through NABD, Port Hueneme, was done efficiently under professional supervision of the experienced shippers. The 2d ESB Liaison Section was notified at 0900 of that day that the troop trains would begin arriving at 1130.

The last information received from Fort Worden about the arrival of troops was on Saturday, 13 December 1947, when it was learned that

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a pre-embarkation physical inspection aboard the train was not practicable. Arrangements were made to utilize a transshipment warehouse on the pier, where Captain Veenschoten had set up the necessary facilities to expedite this physical examination. A slight change in siting the railroad cars lent to establishing a perfect set-up, for the spur was located on the opposite side of the warehouse, leaving ample space for troops to detrain and assemble in the proper formation. The troops reassembled on the ship side of the warehouse and embarked aboard ship. Total distance from the furthest point of original assembly to the gangway was not more than two hundred (200) yards. Total time for processing and embarking all troops (about 620) required not more than two hours. Loading of the main body aboard the Pickaway began at approximately 1250 and was completed at 1535. About forty minutes were lost waiting for the arrival of the third train with the 854th Transportation Port Company. The APA 222 "Pickaway" sailed at approximately 0830, 15 December 1947.

Aboard the Yancey and the Pickaway the 2d ESB had construction units for the primary mission, special staff for directing and planning, radio equipment, signal equipment, and signal personnel for initial communications, heavy shops and diesel and gas mechanics for repair work, medical personnel to establish a field hospital, boat crews and maintenance for small boat operation, special service officer and recreational equipment and liaison pilots and planes, enroute to "Somewhere in the Pacific", for a mission in "Operation Sandstone".

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APPENDIX "A"

FINAL LIST OF EQUIPMENT SHIPPED ABOARD AKA 93 "YANCEY"

Truck, 1/4 ton, 4x4, C & R	17
Sedan, medium	1
Truck, 1 1/2 ton, 6x6, cargo	6
Truck, 2 1/2 ton, 6x6, cargo	17
Truck, 2 1/2 ton, 6x6, dump	12
Truck, tool & bench, M-13, 2 1/2 ton, 6x6	1
Truck, machine shop, light, 2 1/2 ton, 6x6	1
Truck, elec, repair, M-18, 2 1/2 ton, 6x6	1
Truck, heavy machine shop, 2 1/2 ton, 6x6	1
Truck, welding, M-12	2
Truck, 2 1/2 ton, 6x6, tanker, 750 gal.	3
Truck, 2 1/2 ton, compressor, air, truck mounted	2
Truck, 6 ton, 6x6, prime mover	2
Truck, heavy wrecker, 10 ton, M-1, 6x6	1
Crane, Truck mounted, 5/8 cu. yd.	2
Crane, crawler mounted, 3/4 cu. yd.	2
Tractor, crawler, 70-90 DBHP, D-7	2
Tractor, crawler, 90-120 DBHP, D-8	4
Trailer, 1/4 ton, cargo, two wheel	5
Trailer, 1 ton, cargo, two wheel	8
Trailer, 1 ton, water, 250 gal.	4
Trailer, 1 ton, w/generator	2

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Welder, elec, arc, trl. mtd., 1 ton, 2 wheel	3
Lubricator, trailer mounted	1
Router, earth, 3 tooth	1
Scraper, road, towed, 8 cu. yd.	4
Crane, non-revolving, 40,000 lb. cap.	1
Harrow, disc	1
Distributor, asphalt	1
Grader, road, motorized, D-12	2
Grader, road, towed	1
Trailer, 20 ton, low-bed	2
Liaison aircraft (L-4's)	2
Landing craft (LCM-6)	5
Landing craft (LCVP)	3
Boat, utility	1

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APPENDIX "B"

PROPOSED CELLS FOR PROVISIONAL BATTALION

- 1 AAA Battery
- 1 Medical Detachment Type 1A
- 1 Port Stevedore Unit Type CA
- 1 Refrigeration Maintenance Team DG
- 1 Water Distillation Team CC
- 1 Ordnance Auto Maintenance Team DA
- 1 Laundry Detachment Type EA
- 1 Bakery Detachment Type BF
- 1 Quartermaster Supply Detachment Type BA
- 1 Ordnance Supply Team Type CA
- Attached Chaplain
- Signal Composite Unit
 - 1 Message Center Team Type DB
 - 1 Switchboard Team Type GD
 - 1 Depot Team Type GD
 - 1 Radio TTY Team Type CA

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APPENDIX "C-1"

TURN-OVER OF PERSONNEL, HEADQUARTERS COMPANY, 532D EB & SR

(20 October 1947 to 12 December 1947)

DATE	ASGD STRENGTH		TRANSFERS IN		TRANSFERS OUT	
	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>
20 Oct 47	22	109	-	-	-	-
22 Oct 47	22	107	-	2	-	-
24 Oct 47	21	107	-	-	1	-
28 Oct 47	21	106	-	-	-	1
29 Oct 47	22	106	1	-	-	-
30 Oct 47	23	107	1	1	-	-
4 Nov 47	23	106	-	-	-	1
5 Nov 47	29	102	6	3	-	7
6 Nov 47	29	106	-	20	-	16
7 Nov 47	30	98	1	1	-	9
10 Nov 47	23	110	-	14	7	2
11 Nov 47	23	104	1	1	1	7
12 Nov 47	23	111	-	7	-	-
13 Nov 47	23	109	-	-	-	2
14 Nov 47	23	110	-	2	-	1
17 Nov 47	23	104	-	-	-	6
18 Nov 47	23	103	-	-	-	1
19 Nov 47	21	103	1	-	3	-
20 Nov 47	23	103	2	-	-	-
25 Nov 47	22	103	-	-	1	-
30 Nov 47	23	103	1	-	-	-
1 Dec 47	23	103	-	1	-	1
8 Dec 47	23	98	-	-	-	5
9 Dec 47	23	96	-	-	-	2
11 Dec 47	23	94	-	-	-	2
12 Dec 47	23	94	-	-	-	-

TOTALS:

OFFICERS

IN OUT

14 13

ENLISTED MEN

IN OUT

53 68

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APPENDIX "C-2"

TURN-OVER OF PERSONNEL, COMPANY D, 532D EB &SR

(20 October 1947 to 12 December 1947)

DATE	ASGD <u>OFF</u>	STRENGTH <u>EM</u>	TRANSFERS <u>OFF</u>	IN <u>EM</u>	TRANSFERS <u>OFF</u>	OUT <u>EM</u>
20 Oct 47	6	88	-	1	-	-
21 Oct 47	6	85	-	-	-	3
28 Oct 47	6	84	-	-	-	1
31 Oct 47	6	85	-	1	-	-
4 Nov 47	6	84	-	-	-	1
5 Nov 47	6	112	-	30	-	2
6 Nov 47	6	144	-	32	-	-
7 Nov 47	6	146	-	2	-	-
8 Nov 47	6	145	-	3	-	4
10 Nov 47	6	164	-	19	-	-
11 Nov 47	6	219	-	55	-	-
12 Nov 47	6	215	-	9	-	13
13 Nov 47	6	210	-	-	-	5
15 Nov 47	6	208	-	1	-	3
16 Nov 47	6	207	-	-	-	1
17 Nov 47	6	208	-	6	-	5
18 Nov 47	6	208	-	2	-	2
20 Nov 47	8	208	2	3	-	3
21 Nov 47	8	207	-	-	-	1
22 Nov 47	8	207	-	2	-	2
24 Nov 47	8	206	-	-	-	1
25 Nov 47	8	206	-	2	-	2
26 Nov 47	8	204	-	-	-	2
1 Dec 47	8	206	-	2	-	-
2 Dec 47	8	208	-	3	-	1
3 Dec 47	8	207	-	-	-	1
5 Dec 47	8	208	-	1	-	-
9 Dec 47	8	207	-	-	-	1
11 Dec 47	8	204	-	1	-	4

TOTALS:

OFFICERS <u>IN</u>	<u>OUT</u>
2	-

ENLISTED <u>IN</u>	MEN <u>OUT</u>
175	58

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APPENDIX "C-3"

TURN-OVER OF PERSONNEL, COMPANY E, 532D EB & SR

(20 October 1947 to 12 December 1947)

DATE	ASGD STRENGTH		TRANSFERS IN		TRANSFERS OUT	
	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>
20 Oct 47	4	106	-	-	-	-
21 Oct 47	4	103	-	-	-	3
28 Oct 47	4	101	-	-	-	2
2 Nov 47	4	100	-	-	-	1
5 Nov 47	4	114	-	15	-	1
6 Nov 47	6	123	2	9	-	-
7 Nov 47	6	140	-	19	-	2
10 Nov 47	6	222	-	82	-	-
12 Nov 47	6	213	-	8	-	17
13 Nov 47	6	209	-	-	-	4
14 Nov 47	6	207	-	-	-	2
15 Nov 47	6	203	-	1	-	5
17 Nov 47	6	202	-	7	-	8
20 Nov 47	7	199	1	3	-	6
21 Nov 47	8	199	1	-	-	-
22 Nov 47	8	203	-	7	-	3
25 Nov 47	8	204	-	2	-	1
26 Nov 47	8	201	-	-	-	3
28 Nov 47	8	205	-	4	-	-
4 Dec 47	7	205	-	2	1	2
5 Dec 47	8	204	1	-	-	1
9 Dec 47	8	205	-	4	-	3
11 Dec 47	8	202	-	1	-	4

TOTALS:

OFFICERS	
<u>IN</u>	<u>OUT</u>
5	1

ENLISTED MEN	
<u>IN</u>	<u>OUT</u>
164	68

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APPENDIX "C-4"

TURN-OVER OF PERSONNEL, MEDICAL DETACHMENT, 532D EB & SR

(20 October 1947 to 12 December 1947)

DATE	ASGD STRENGTH		TRANSFERS IN		TRANSFERS OUT	
	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>	<u>OFF</u>	<u>EM</u>
20 Oct 47	5	14	-	-	-	-
21 Oct 47	5	11	-	-	-	3
7 Nov 47	5	9	-	-	-	2
8 Nov 47	4	9	-	-	1	-
10 Nov 47	2	9	-	-	2	-
12 Nov 47	2	14	-	5	-	-
16 Nov 47	2	13	-	-	-	1
18 Nov 47	2	21	-	8	-	-
20 Nov 47	2	25	-	4	-	-
25 Nov 47	2	24	-	-	-	1
26 Nov 47	3	24	1	-	-	-
1 Dec 47	3	25	-	1	-	-
4 Dec 47	5	20	2	-	-	5
12 Dec 47	5	20	-	-	-	-

TOTALS:

OFFICERS		ENLISTED MEN	
<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>
3	3	18	12

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PART II - 1220th PROVISIONAL ENGINEER BATTALION

ACTIVITIES UP TO EMBARKATION

CHAPTER 1 - ADMINISTRATION:

1. Organization:

a. Authority: General Order Number 97, dated 22 October 1947, Headquarters Army Ground Forces, Pacific, APO 958. Later amended by General Order Number 104 to add certain personnel to Battalion Headquarters.

b. Date and place of organization: 25 October 1947, at Fort Kamehameha, T.H., APO 954.

c. Breakdown of Battalion: (All personnel DS from organizations of USARPAC.)

<u>Battalion Headquarters</u>	<u>T/O & E</u>	<u>AUTHORIZED</u>		
		<u>OFF</u>	<u>WO</u>	<u>EM</u>
1-Bn Hq (AD)	5-500	4	1	16
1-Mess Team (AF)	5-500	-	-	6
1-Mess Team (AG)	5-500	-	-	8
1-Supply Team (BA)*	5-500	-	-	11
1-Medical Detachment (IA)*	8-500	3	-	9
1-Army Postal Unit type E	12-605	1	-	9
Attached Chaplain		1	-	1
Attached CIC		2	-	1
		11	1	61

* Difference in T/O & E of officer strength by deletions or additions.

<u>1219th Signal Service Platoon</u>	<u>T/O & E</u>	<u>OFF</u>	<u>WO</u>	<u>EM</u>
1-Depot Team (CA)	11-500	1	-	8
1-Message Center Team (DB)	11-500	4	-	12
1-Switchboard Team (GD)	11-500	1	-	33
1-Radio Teletype (EP)	11-500	2	-	19
		8	0	72

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<u>1218th Composite Service Plat</u>	<u>T/O & E</u>	<u>OFF</u>	<u>WO</u>	<u>EM</u>
1-Ord Supply Team (CA)	9-500	1	-	17
1-Ord Maint Team (DA)	9-500	1	-	28
1-QM Supply Team (BA)	10-500	1	-	19
		3	0	65
 <u>1217th Composite Service Plat</u>				
1-QM Bakery Det (BF)	10-500	-	-	6
1-QM Laundry Det (EA)	10-500	1	-	13
1-Trans Stevedore Sec (CA)	55-500	1	-	19
		2	0	38
 18th Engineer Construction Company w/attachments				
	5-77	4	-	175
1-Engr Refrigeration Maint Team (DG)	5-500	-	-	3
1-Engr Water Distillation Team (CC)	5-500	-	-	5
		4	0	183
AGGREGATE		28	1	419

2. Record of Events:

a. Organization:

- (1) 22 October - Major W. J. Hussey, Commanding Officer, and Captain C. W. Lowe comprised the Battalion Staff.
- (2) 23 October - 1st Lt. T. J. Hall joined as Supply Officer and an advance detail of 12 EM arrived for duty.
- (3) 23-24 October - The Supply Officer with the advance detail drew Post, Camp & Station property to set up the Battalion Area in Fort Kamohamoha to receive the remainder of the Battalion less the 18th Engineer Construction Company.

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- (4) 18th Engineer Construction Company remained at permanent station, APO 957.
- (5) 25 October - Personnel for Bn Hq, Ord Maint Team, Ord Supply Team and Signal Teams reported for duty.
- (6) 27 October - Stevedore Team, Laundry Team, Bakery Team and attached 7th Air Cargo and AACCS Dets reported for duty.

b. Activities: 25 October to 15 November 1947:

- (1) Unit devoted the first few days at Fort Kamehameha to Policing the Battalion Area.
- (2) As each group arrived they were given a security briefing and signed the Joint Task Force Security Pledge.
- (3) Team Commanders inspected individual clothing and equipment of EM assigned their teams. The required clothing and equipment was issued within three days.
- (4) The Commanding General USARPAC (Major General Decker) inspected the Battalion during the first week of November.
- (5) All individuals were given a dental inspection and all immunizations were brought up to date during this period.
- (6) During this period Team Commanders instructed their assigned personnel in duties to be performed in the Teams.

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- (7) Numerous changes were made in the assigned personnel during this period as Team Commanders discovered men not qualified in designated MOS and/or other reasons.
- (8) Personnel of the Battalion were used to assist in processing of supplies loaded on LST's at Iroquois Point, T.H., and on Coastal Crusader at Victor Piers, Pearl City, T.H.
- (9) Loading lists for supplies and personnel submitted to Navy during first week in November.
- (10) Loading of supplies on LST's 45, 219, and 611 completed by 14 November.
- (11) Passenger lists submitted by 14 November to all headquarters concerned. Personnel to be loaded on ships as indicated:

LSD 19	4 Off	89 EM
LST 45	7	121
LST 219	8	121
LST 611	2	123
Coastal Crusader	2	

- (12) The advance party to proceed by air was to consist of:

Bn C.O. - Major Hussey
C.O., 18th Engr Constr Co - Captain Batz
1 Off - 18th Engr Constr Co
2 Navy Utilities Officers
2 Civilian Technicians
28 EM 18th Engr Constr Co and Navy Utilities men

- (13) Personnel for water transportation of LST's and LSD were loaded on 15 November and departed Oahu that date.

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- (a) Personnel of 18th Engr Constr Co were moved from Schofield Barracks to Iroquois Point by truck transportation and placed aboard LST 611.
- (b) Battalion personnel (less those for LSD) stationed in Area #2, Fort Kamehameha, were moved by truck transportation to Bishop Point and there embarked into small boats for transportation to Iroquois Point, embarkation point for personnel to go aboard the LST's.
- (c) Personnel to be loaded on LSD 19 were moved by truck transportation from Fort Kamehameha to the Victor Pier at Pearl City and boarded the ship there.
- (d) The following units were attached to the Battalion for movement. (Movement Order #3, dated 1 Nov 1947, with Amendment #1, dated 12 Nov 1947, Hq AGFPAC.)
- | | | |
|---------------------|-------|-------|
| Prov AACCS Det | 1 Off | 25 EM |
| 7th Air Cargo Det | 1 Off | 20 EM |
| Navy Shore Base Det | 5 Off | 60 EM |
- (e) Two Navy officers and one officer of 7th Air Cargo Det did not depart with Battalion but joined later on Eniwetok.

- (14) Advance party departed Hickam Field on 17 November 1947.

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CHAPTER 2 - SUPPLY:

1. Activities:

Prior to organization day. - During 23 and 24 October the Supply Officer with an advance detail of four men from the mess team and eight men from the Bn Supply Teams drew Post, Camp and Station property necessary for quartering of personnel of the battalion in Area #2 at Fort Kanehameha.

2. General Activities During Period 25 October to 15 November 1947:

a. Property Accountability:

- (1) When the battalion was first formed it was intended that only one property account would be used and that all property would be shipped to this Account Number (GP285). As work of organizing progressed it became apparent that this was not a workable plan considering the future mission of the battalion and amount of money involved. Therefore separate account numbers were obtained for each of the services.
- (2) The service depots on Oahu were to furnish shipping documents to the consolidated property account of all property shipped to the battalion. These in turn were to be turned over to the various property accounts after arrival at destination.

b. Obtaining Supplies for Shipment to APO 187:

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- (1) During this period the Battalion Supply Officer with the help of the Technical Supply Officers of the various supply teams prepared requisitions for all supplies to be loaded aboard the LST's 45, 219, 611 and 1135 and the USAT Coastal Crusader.
- (2) The Technical Service Depots located on Oahu were charged with the responsibility of delivering supplies and equipment to the designated loading points.
- (3) Loading points for supplies to be loaded aboard the LST's was Iroquois Point. Those for the Coastal Crusader, Victor Pier #5 at Pearl City.

c. General Breakdown of Supplies to be Loaded Aboard each Vessel was:

- (1) LST 45 - Total Ship Tons 1829

This included: Vehicles, contractor's list of supplies and equipment; 18th Engineer equipment; three lists of Navy supplies, i.e., distillation units, generators and miscellaneous utilities supplies.

- (2) LST 219 - Total Ship Tons 846

This included: 24 vehicles and 125 miscellaneous boxes of automotive maintenance and signal supplies.

- (3) LST 611 - Total Ship Tons 1564

This included: Vehicles, equipment and supplies of the 18th Engineer Construction Company.

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(4) LST 1135 - Total Ship Tons 1650

This included: Vehicles and miscellaneous supplies.

(5) Coastal Crusader - Total Ship Tons 4950

This included: Vehicles, signal supplies, Post Exchange supplies and other miscellaneous supplies.

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CHAPTER I
FORWARD ECHELON

The USS Yancey departed Fort Worden, Washington on 10 December 1947, with the advance detachment, 532d Engineer Boat and Shore Regiment, and was five days at sea when the main body of troops of TG 7.2 embarked at Port Hueneme. Aboard the USS Pickaway sailing from Port Hueneme were Hqs., 532d EB & SR, Hqs & Hqs Co., 532d EB & SR, Med. Det, 532d EB & SR, Co D, 532d EB & SR, Co E, 532d EB & SR, 854th Port Company, 461st Transportation Amphibious Truck Company (DET), Composite Signal Group and Det. of USN Cable laying group.

Aboard the USS Yancey were the advance detachments of each unit of the 532d EB & SR consisting mostly of heavy equipment operators and maintenance men, supply personnel and the 2d ESB Embarkation Section. The USS Yancey was the Cargo ship loaded with construction equipment and organizational gear while the USS Pickaway was primarily the troop ship. Both ships were loaded without incident and departed on time.

With the USS Pickaway and Yancey enroute to the Marshall Islands, no time was lost by the first echelon of TG 7.2 already located on Eniwetok Atoll in preparation for Operation Sandstone. This group consisted of the service units and service teams organized to form the 1220th Provisional Battalion from Oahu, TH.

Major William J. Hussey, then Island Commander, arrived by air at Eniwetok 20 November 1947 with a group of 40 Army and Navy

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rehabilitation and utilities personnel to prepare and have ready for use, the power and water distillation units when the troops debarked. When the main body of the 1220th arrived on the 29th of November, Major Hussey directed a gradual debarkation ashore where a CP was established, calling for units when their messes and areas were completed and ready for the troops. Of all the inconveniences experienced, the lack of telephones for the first week was the worst, having to maintain contact by means of runners.

Among the initial personnel to arrive by air with Major Hussey, was Lt(jg) H. L. Bowman, USN, OIC of the Navy utilities team with sixteen (16) Navy utilities personnel arrived by air. This team made an attempt to rehabilitate or salvage some of the existing unserviceable power and water distillation units on Eniwetok, which were rusted beyond recovery. Ten out of twenty five reefer units were, however, reconditioned. The rapid deterioration of the existing installations exposed to the salt spray and hot sun dimmed any hopes that an appreciable amount of this equipment might be placed in operation before the main body of troops arrived.

Ensign D. A. Ellis, CEC, USN, who had been part of the previous Navy garrison and consented to remain with the Utilities Team, accompanied Major Hussey and acted in the capacity of guide. Ensign Ellis had completed an eleven month tour of duty as Public Works Officer on the Staff of the Island Commander, Eniwetok, prior

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to deactivation of the base about June 1947. Ensign Ellis accompanied the JTF 7 staff who made the preliminary survey of the Atoll. Ensign Ellis also prepared a list of materials which he considered necessary to install the utilities required, based on an anticipated island population of two thousand (2000) men during the height of the operation. This list was supplementary to the original one prepared by the planning staff of JTF 7.

Ensign Edward S. Nuss, CEC, USN, also another early arrival was assigned the duties of POL Officer. Ensign Nuss was to prepare to receive fuel into the fuel tank farm from tankers.

During this period an organization plan for the Utilities Team was drawn up and put into effect upon request of Major Hussey. This organization placed Lt.(jg) Bowman as OIC and made the team in effect, a utilities platoon within the 18th Engineer Construction Company. Responsibility was further delegated by making Lt Bowman the supervisory officer over installation and operation of water distillation equipment and the allied jobs of plumbing and pipe-fitting. Ensign Ellis was designated supervisory officer over the electrical and generator sections and temporarily in charge of refrigeration equipment. Ensign Nuss remained OIC of POL supply and was to take over the refrigeration section from Ensign Ellis as soon as the initial stock of fuel was received. This division of responsibilities remained basically unchanged throughout the operation.

The 1220th Provisional Battalion sailed from Honolulu on or

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about 17 November 1947 aboard a convoy of the following vessels: USAT Coastal Crusader, LSD 19 (USS Comstock), LST 45, LST 219 and LST 611. The advance detail from the ships debarked early on the 29th of November 1947, the day of arrival at Eniwetok, went ashore on the main island to increase a troop mess and living quarters ashore for the Battalion. The first LST also beached on 29 November to be unloaded while the convoy anchored in position for debarkation in Eniwetok lagoon. Day and night unloading of LST's continued until the last one was completed. On 1 December 1947 all troops of the 1220th were ashore.

Rehabilitation of Eniwetok island was begun immediately. The 18th Engineer Construction Company, then part of the 1220th, making preparation for the arrival of the main body of troops from the U.S., about 25 December 1947. The semi-permanent Nissen huts which covered about ninety percent of the building areas on Eniwetok island, except for the existing airdrome, had suffered severe deterioration from rust, some to a point beyond practicability of repair. Warehouses and storerooms containing material marked "China" afforded some protection, but these too had been subjected to damage by the high humidity, salt spray and the elements in general. Only in rare instances were buildings found in a condition to afford immediate occupancy. The majority of the huts, shops, warehouses and other buildings required extensive rehabilitation including rewiring, painting, new doors, and sash, etc.

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Each of the service units of the first echelon immediately organized and put into operation their services. APO 187 was in full operation on Eniwetok on 5th December 1947, although mail service began on the same day the convoy anchored with the delivery of the incoming mail on the island waiting the arrival of the troops. Quartermaster was shore, and in full operation from the first day of their arrival, to provide rations for the debarking troops. The supply units had established warehouses and received the cargo as it was unloaded from the ships.

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CHAPTER II
DEBARKATION

The Regimental Commander, 532d EB & SR, Lt Col Henry M. Salley, and the Operations Officer, Major Rex K. Shaul accompanied by Major R. L. Shipp, Special Staff Officer, T.C., arrived on Eniwetok Island 24 December, 1947, and reported to Brigadier General D. A. D. Ogden who had arrived four days earlier. Gen Ogden had assumed command of ISCOM, Eniwetok Atoll and TG 7.2 upon his arrival, relieving Major Hussey who returned to his original duties on the J-4 Staff, JTF 7 Forward in Oahu, TH.

The USS Yancey was anchored in position for debarkation just off Eniwetok island on 24 December but unloading was postponed to enable the troops to enjoy their Xmas holiday and dinner aboard the ship. The USS Pickaway's estimated time of arrival was known to be the 28th of December which contributed to the prior planning of debarkation.

Lt Col Salley, Lt Col Harper, 2d ESB Liaison Officer, Major Shaul and Major Shipp attended the staff conference held in General Ogden's office where the latest developments, progress and changes were reviewed and discussed. On 24 December General Ogden chose an acting staff to function immediately to prepare agencies ashore for the purpose of expediting the rapid unloading of the USS Yancey and Pickaway.

The 532d Engineer Boat and Shore Regiment's LCM's and LCVP's were unloaded 24 December and ordered to report to the Navy Mobile Boat Pool Headquarters on the USS Comstock. Lt Harry F. Prock, CE Boat Officer,

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was CIC of the Army boat section, attached to the Navy for operations. With the unloading of the LCM's only token unloading took place until after the Christmas Holiday. Full unloading operations of the USS Yancey began at 0600 on 26 December about 1100 hours. Navy and Army LCM's and two (2) Navy LCT's were used as lighterage. Eight (8) officers, one (1) Warrant Officer and one hundred nine (109) enlisted men of the advance detachment, passengers on the USS Yancey, were ashore on 27 December. No delay was encountered in the unloading of this ship and she sailed for Engebi, where the 18th Engineer Construction Company had already begun preliminary work to discharge materials for the project.

The USS Pickaway dropped anchor about 0830 in Eniwetok lagoon on 28 December. Lt Col Salley, Major Shaul and Major Shipp came aboard to welcome the troops and make known their discoveries. After spending but a short time on board, Staff Officers and Unit Commanders went ashore to attend a conference and receive their debarkation orders.

In the opening of the conference, unit commanders reported activities on embarkation and on life aboard ship. They proudly described the efforts of reorganization, boasting about their formidable construction teams, all based on the sparse information and knowledge received prior to embarkation. They reviewed the educational program initiated and followed during the twelve day sea voyage and the anxiety shown by all to begin construction. The morale was high and all seemed to adopt the proper frame of mind. Officers and NCOs were armed with reference data and manuals and eager to begin.

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The Unit Commanders were surprised to learn of Eniwetok rehabilitation yet to be performed, delaying their plans to proceed in toto to the second and third Zero Islands; however, this change was taken in stride. The 18th Engineer Construction Company, originally assigned the mission of rehabilitating Eniwetok Island, had moved before completion of the task to Engebi where they were already installed and had begun preliminary clearing and grading. In view of this change, each Unit of the 532d EB &SR would contribute a share of skilled men, labor and equipment to be incorporated into a provisional unit for completion of the rehabilitation assignment on Eniwetok and also of rehabilitation of Parry Island facilities. This meant rapid reorganization without deviation from the schedule of departure to their construction sites.

The debarkation plan was reviewed and adopted. All units would debark on Eniwetok; however, the construction units would remain only long enough to regroup, sort their equipment and supplies and prepare to reship by smaller craft to their construction sites where construction camps would be established.

It was planned to have each of the construction camps so organized that they would be self sufficient: maintain their own power and water supply, prepare housing for civilian construction crews, and provide for their own recreation, all over and above the assigned construction mission which retained the first priority coupled with a rugged progress schedule and deadlines. All this amounted to a challenge to make the best of a rough start which startled the newcomers but appeared like an old story to the experienced veteran.

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Unit commanders returned to the USS Pickaway to put into action the debarkation and to prepare the troops to go ashore on Eniwetok. After four hours of waiting for the LCMs, the Troop CO requested assistance from a passing LCT and moved the main body of the 532d EB & SR ashore while the few Dukws operated by the advance detachment of the Port Company debarked the 854th Port Company and the 461st AMPHIBIAN Truck Company.

Upon beaching the troops marched to their respective areas where the evening meal was served, prepared by advance details who debarked earlier for this purpose. Little or no rest was enjoyed by the Engineer units this first night, being taxed heavily in providing labor details to move, store and sort equipment for transshipment. The first groups to depart for construction sites were selected and readied for an early start in the morning. Here was the first instance where the individual first displayed his enthusiasm and determination, a gratifying reward for the unit commander and his officers.

After providing reliefs of unloading gangs on the ships and on the beach, the 854th Port Company deserved praise for taking over the unloading duties with no lost motion. No one suspected, except the few that knew, that this unit was handicapped by young, inexperienced men, yet the cargo was rapidly unloaded and easily handled.

Operators from the 461st Amphibious Truck Company took over from the substitute drivers of the advanced detachment of the 854th Port Company, without interruption of activities on 28 December.

Stevedor crews worked around the clock to complete the unloading

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of the Pickaway with the exception of the cable laying cargo. On 1 January, the USS Pickaway weighed anchor and moved into position for offloading of the balance of her cargo at Parry Island.

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CHAPTER III

ORGANIZATION OF ISCOM, HEADQUARTERS TG 7.2

On 29 December 1947, the main body of TG 7.2 was installed on shore on Eniwetok and progress in general was directed by the acting staff selected from the advance groups. The General Staff assignments made prior to embarkation remained unchanged, however, additions to the Special Staff were assigned at this time. These officers were acting in their capacities at the time of selection; namely, Signal Officer, Quartermaster Officer, Surgeon and CO of Hospital, Utilities Officer, Post Exchange Officer, Postal Officer and Headquarters Commandant. (CIC and Light Aviation were incorporated into Headquarters 7.5 and Headquarters 7.4.9 respectively.)

From the units represented the following officers were selected to form the General and Special Staff.

GENERAL STAFF

Brigadier General D. A. D. Ogden	Atoll Commander and CTG 7.2
Lt Col James E. Harper, Jr	Executive Officer, TG 7.2
Lt Col Henry M. Salley	C.O., 532d EB & SR
Captain Carl W. Lowe, Jr	S-1 and Administrative Officer
Major Rex K. Shaul	S-3
Major Thomas J. Osekowski	S-2
Major Bert DeMelker	S-4
Lt Rolland A. Lozeau	Adjutant

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Brigadier General D. A. D. Ogden was designated Atoll Commander for Joint Task Force 7 and in addition, Commander of TG 7.2 or the Army Task Group.

Lt Col James E. Harper, Jr. Executive Officer TG 7.2 had also served as Liaison Officer, 2d Engineer Special Brigade and was one of the early arrivals at Eniwetok with the forward echelons.

Lt Col Henry M. Salley, Commanding Officer of the 532d EM & SR, supervised all construction and activities through the S-3 office for control and coordination, reporting directly to CTG 7.2.

Major Rex K. Shaul, directed control of personnel and equipment for construction and was chief coordinator of activities of all units of TG 7.2. He was also responsible for keeping records of events and completion reports, progress charts and progress reports.

Major Thomas J. Osekowski, assigned the principal duty of S-2, assisted S-3 in a combined S-2, S-3 office for close coordination. He supervised security control by CIC and security personnel operations on Eniwetok atoll until TG 7.5 established their headquarters on the island. In addition, he directed operations of ISCOM Light Aviation Section until the formation of TU 7.4.9 and coordinated activities of the Air Base with ISCOM. Coordination of Photo Teams movements was controlled by the S-2, S-3 Office.

Major Bert DeMelker was appointed S-4. His duties included the direction of Signal Supply, Quartermaster Supply and Laundry, Ordnance Supply and Maintenance, Medical Supply, Engineer Supply and Maintenance. The Port Director and the Embarkation Section were a function of the S-4.

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Incoming supplies, sorted and broken down in trans-shipment warehouses for inter-island distribution, was a constant function and responsibility of this office. The POL Officer, Ensign E. S. Nuss, also came under the direction of the S-4.

1st Lieutenant Rolland A. Lozeau was appointed Adjutant of TG 7.2. Lt Lozeau also retained his previous assignment as Adjutant of the 532d EM & SR. As Adjutant TG 7.2, Lt Lozeau's duties comprised normal administrative duties, assigning air priorities to personnel departing this Headquarters and acting as assistant to the Top Secret Control Officer, Lt C. C. Watson. Assisting Lt Lozeau were CWO W. V. Brown and WOJG W. F. Hopkins who acted as the Personnel Officers for TG 7.2.

SPECIAL STAFF

Major Jesse D. Kelsay	Executive Officer, 532d EM & SR, Island Commander, AMBIRO
Capt Erwin O. Jung	Headquarters Commandant Iscom Hqs
Capt David C. Morrow	Asst S-3
Capt Peter H. Wolfe	Asst S-3
Capt Joseph Whol	OIC Utilities
Capt Nevio Petrini	Equipment Maintenance Officer
Lt Louis A. Jennings	Asst S-3
Lt John J. Kentzel	Embarkation Officer
Lt Eugene C. Murphy	Embarkation Officer
Lt Anton F. Vaitonis	Liaison Pilot, OIC Liaison Air Section
Lt George R. Lightkep	Liaison Pilot
Lt John J. Rafferty	Special Service Officer
Lt Walter Cadman	Postal and PX Officer

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CWO Roy W. Ligon

WOJG Walter F. Hopkins

Major George F. Rogers

Major P. H. Rittenhouse

Major Oscar Gibson

Capt R. T. Matlavish

Capt G. H. Carr, Jr

Capt J. P. Bergman

Lt O. H. Rodgers

CWO C. L. Champ

Lt H. E. Sharples

WOJG T. B. Black

Lt J. A. Skelton

Lt L. F. Krøger

Major R. L. Shipp

Lt R. O. Jacobson

Capt R. W. Heaviside

Major J. F. Shea

Capt Herbert Batz

Capt G. D. Barnette

Lt T. L. Suchomel

Lt J. C. Hallowell (USN)

Asst S-4

Asst S-1 (Personnel Officer)

Signal Officer

Signal Supply Officer

CO, 1220th Prov Bn
Port Director

Island Surgeon, CO,
Medical Det, 532d EM & SR

Security Officer

Ordnance Maintenance Officer

Ordnance Supply Officer

Engineer Supply Officer

Q. M. Supply Officer

Top Secret Control Officer

Finance Officer

TC Supply Officer

Special Staff Officer
TC

CO, Air Base

CO, AACS

Chaplain

Island Commander, Engebi CO,
18th Eng. Const. Co.

Island Commander, Aoman-Biljiri-
Rojos Islands CO, Co. D., 532d
EB & SR

Aide to General Ogden

OIC, Navy Shore Based Det. Asst.
Port Director

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Major J. Kelsay maintained his position as Executive Officer, 532d EB & SR, and reported direct to Lt Col Salley on routine administrative matters of the Regiment. He coordinated the movement, especially of skills, from one job to another. Major Kelsay exercised field command of all zero islands as test dates approached and was responsible for coordination and last minute arrangements.

Capt Erwin O. Jung was designated to maintain his position as Headquarters Commandant. Capt Jung's jobs were many and varied; he was responsible for billeting, building assignments, procurement and distribution of office equipment, supervision of the general police of the island and supervision of sanitation. During the early part of the operation Capt Jung also coordinated the utilities for the island.

Capt Peter H. Wolfe continued in his job as S-4 of the 532nd EM & SR and was also in addition assistant to Major Demelker, Island S-4.

Capt David C. Morrow, was appointed Assistant S-3, working under Major Shaul. Capt Morrow was made responsible for equipment control, boat control, personnel control and the assigning of priorities, work orders and supervision of construction projects on Eniwetok and Parry Islands.

Capt Joseph Whol was appointed Officer in Charge of Utilities. In reality, Capt Whol acted as a Post Engineer. He was responsible for the supervision of utility operations on Eniwetok Island.

Capt Nevio Petrini was appointed engineer equipment Maintenance Officer for ISCOM. In addition, Capt Petrini was responsible for the supervision of the maintenance of the Vehicles and equipment of the

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532d EB & SR. In these departments he was ably assisted by Lt H. E. Halford in charge of heavy maintenance and CWO Anthony J. L. Morency, who in addition to being Motor Officer for Headquarters Company, 532d, handled the Ordnance Maintenance for the entire Regiment.

Capt Carl W. Lowe in addition to his job as Executive Officer of the 1220th Provisional Engineer Battalion, was appointed assistant to Lt Col Harper, Executive Officer, TG 7.2. He also served in the capacity of S-1 and Administrative Officer.

Lt Louis A. Jennings, as assistant S-3, was made responsible for all reports, progress charts and logistical data.

Lt John J. Kentzel continued in his position as Embarkation Officer. Lt Kentzel was responsible for receiving bookings for all inter-island shipment of supplies, equipment and vehicles, ordering the necessary boats and seeing that equipment and supplies were loaded out. Lt E. C. Murphy was also a member of this section. The Embarkation Section worked under the S-3 during the early part of the operation but was later placed under the control of the S-4.

Lt Anton F. Vaitonis, Liaison Pilot, was appointed Officer in Charge of the Brigade Air Liaison Section and continued in this capacity until the arrival of Captain C. J. Chrysler who assumed command of all light planes as CTU 7.4.9.

Lt John J. Rafferty was appointed Special Service Officer for TG 7.2 and in addition acted as I & E Officer until the arrival of Capt Frank Marzano.

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Lt Walter Cadman, the Postal Officer, APO 187, also acted as PX Officer until the arrival of Capt James Owens. Lt Cadman was evacuated because of ill health late in March, being replaced by Lt K. H. Klossen who arrived early in April.

Major Oscar Gibson was assigned the primary job of Port Director with the additional duty of Commanding Officer of the 1220th Provisional Engineer Battalion. In his job as Port Director, Major Gibson had as his assistants, Lt Thomas Kelley of the 854th Port Company and Lt J. C. Hallowell, USN.

Capt R. T. Matlavish, in addition to his duties as Commanding Officer of the Medical Detachment, 532d EM & SR, was appointed Island Surgeon and was responsible for all land based medical activities on the Atoll.

Capt G. H. Carr, Jr, with a small detachment of CIC agents, acted as the security detachment commander for the entire atoll, until the arrival of Headquarters TG 7.5.

Capt J. P. Bergman and Lt O. H. Rodgers served as the Ordnance team, with Capt Bergman handling all maintenance in the Ordnance line for the entire Atoll and Lt Rodgers handled the Ordnance Parts and Supply.

CWO C. L. Champ was given the job of Engineer Supply Officer. As the operation was primarily a construction one, CWO Champ's Supply Section was one of the busiest on the Atoll.

Lt H. E. Sharples was initially assigned the job as QM Supply Officer, with Lt Richard Metzger as his assistant and Sales Officer. Upon the arrival of Capt E. Sleeper in March, Capt Sleeper assumed the

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duties as QM Supply Officer, Lt Metzger became assistant to Capt Sleeper and Lt Sharples was appointed Sales Officer.

At the outset of the operation WOJG T. B. Black was appointed Top Secret Control Officer. In February he was succeeded in this job by Lt C. D. Watson and WOJG Black became billeting officer on Eniwetok Island.

Lt L. F. Kreger became the Transportation Corps Supply Officer and drew his staff from the 854th Transportation Port Company.

Major R. L. Shipp, a member of the JTF Special Staff, TC acted as advisor to Major Gibson and assisted in the operation of the Port.

Capt Herbert Batz, Commanding Officer of the 18th Engineer Construction Company, was appointed Island Commander of Engebi Island. Capt Batz was responsible for all construction on his island.

Capt George D. Barnette, Commanding Officer, of D Company, 532d EM & SR, was appointed Island Commander of AMBIRO and was responsible for all construction performed on this island. Capt Barnette was succeeded in his duties as Island Commander by Major Kelsay in March, 1948.

Lt Byron A. Brim, Commanding Officer of Company E, 532d EM & SR was appointed Island Commander of Runit Island and was responsible for all construction performed on this island.

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CHAPTER IV

ASSIGNMENT OF CONSTRUCTION MISSIONS

Attention is invited to appendix #3, Chart of Eniwetok, Atoll.

At a conference on 26 December, Lt Col Henry M. Salley assigned construction missions to all units at a conference at ISCOM, Headquarters. The 18th Engineer Construction Company was assigned the mission on Engebi Island where they were already installed and had begun preliminary work. D Company, 532d EB & SR was assigned the mission on Aomon, Biijiri, Rojoa Islands, E Company was assigned the Runit Island mission and Hq and Hq Co was installed on Eniwetok Island to function as a service unit for ISCOM and provide personnel to assist other allied Headquarters on the Island.

In addition to construction duties on their islands, each unit would provide housing and housekeeping facilities for Civilian workers engaged in AEC work. On each island an engineer representative from the office of the Engineers, JTF 7, would establish his Headquarters where plans of all construction would be kept. The representative, known as the Resident Engineer, would direct the construction and coordinate activities with the separate islands to insure simultaneous progress.

D and E Companies of the 532d would also provide assistance to the civilian contractor on the lagoon tower and Aniyaanii Photo Tower projects (under Runit jurisdiction), and the causeway joining Aomon Island with Biijiri Island (under Aomon jurisdiction).

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Although E Company's assigned area of construction was less than D Company's considerably more grading was required to obtain the desired contour on Runit. This was also the factor considered when equal distribution of man power was discussed. In view of the fact that less clearing and other preliminary work was necessary on Runit, this unit was committed to furnish the majority of the personnel for the provisional construction detachment on Eniwetok, in addition to one officer.

On about 15 January 1948, the shifting and transferring of personnel simmered down to a reasonably firm organization on each project and gave support to the belief that there would be a shortage of manpower. The strength figures planned were based on the construction missions only, but these were rendered more difficult by necessity of reorganization to take on added burdens of rehabilitating Eniwetok island and other lesser projects.

Construction on Engebi Island had started on 6 December, with the arrival there of the survey party, the foundation crew of the MK-PK Company and fourteen (14) NCOs and men from the 18th Engineer Construction Company. On this date excavation of the 200 ft tower footings was started by the MK-PK Company and the 18th Engineers began clearing and initial grading for the main control line between the zero tower and the timing station sites. Until 24 December, all construction personnel, civilian and military, lived aboard the LST 45 or the LST 219 which were alternately anchored off-shore to act as "floating hotels."

Since the preliminary clearing and grading was reasonably complete on Engebi, when the main body of troops arrived at Eniwetok, the Aomon and

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Runit projects would look to Engebi for advice and use her as a model.

On 22 December, enough of the initial survey work was completed on Aomon to enable tower erection crews to start construction on the foundation work of the 200 foot tower. By 5 January, D Company, 532d EB & SR, was established ashore and construction activities were in full swing, eight days after their arrival on the atoll. The Hawaiian Dredging Company was getting set up ashore on Biijiri to begin construction of a steel sheet pile causeway to Aomon Island and MK-PK personnel were sorting steel for tower erection. Clearing and grading, which involved a total of one hundred thirty-five (135) acres, was begun on 1 January. The top soil, averaging a foot in depth on both Aomon and Biijiri, is a very fine, black coral dust, which made all clearing and grading of these islands very difficult because of the large quantities of dust.

Clearing of approximately fifty acres of coconut trees and moving of 50,000 cubic yards of earth was necessary before surveying and layout of structures and construction work could begin on Runit Island. This clearing and grading commenced on 29 December when the first contingent of Company E came ashore with two bulldozers and began clearing an air-strip for the Brigade planes. The remainder of Company E were installed on Runit on 5 January, and began rehabilitating existing structures, established a water point, and started construction of civilian quarters. Members of the MK-PK Company, who had completed the footings for the 200 foot tower while quartered aboard the LST 219, moved ashore with the company and began tower erection.

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CHAPTER V

ASSIGNMENT OF SPECIAL DUTIES

In addition to the construction missions assigned, there were other commitments which had to be met by contribution from each unit. These varied from special projects to reinforcement of ISCOM Overhead Detachments. Since permission to include these in the prior planning could not be secured, detaching personnel from the units for this purpose became necessary and imposed an additional burden on the units. To furnish the necessary manpower and the appropriate skills required continuous reorganization of the construction units which not only interrupted the regularly assigned mission, but interfered with the smooth operation of the force. The necessary clerks, typists and general duty soldiers were accordingly procured from the units of the 532 Engineer Boat & Shore Regiment.

The small force of Naval Utilities personnel were augmented by twenty (20) semi-skilled men who would function as generator repairmen, plumbers and electricians, from the 532d Engineer Boat and Shore Regiment. To establish a carpenter shop and an overall general repair section on Eniwetok Island, one (1) officer and thirty-two (32) EM came from Company "E", 532d EB & SR and thirty one (31) men from Company "D" 532d EB & SR. From this group were selected the skills to augment the utilities group mentioned earlier in this paragraph.

Rehabilitation of Parry Island requested by the Task Force Engineer, required four (4) weeks to complete. One (1) officer and fourteen (14) EM from "D" Company accomplished this task and returned to Aomon Island

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after power, water and housekeeping installations were completed.

ISCOM Motor Pool was organized by reinforcing the nucleus of the Headquarters and Headquarters, 532d EB & SR. The added vehicles and drivers came from the 532d EB & SR units until an average of sixty-two (62) dispatches were issued daily during the month of February, March, and April. About one third of this number of units were supplied from USARPAC to meet the requirements of the Utilities Detachment and the transportation of visiting VIPs. The ISCOM Motor Pool during this period maintained its efficiency by continuously training new drivers and operators for new equipment as it arrived.

A small guard detachment of 1 NCO and 10 EM from the Marine Corps was reinforced from the letter companies of the 532d EB & SR to bolster the security program which increased with the population and the arrival of classified material.

Rehabilitation of Eniwetok Island was under direct supervision of the Operations Section of ISCOM. This work was delegated proportionately to the Utilities, Carpenter Shop and Headquarters and Headquarters Company, 532d EB & SR, the latter furnishing the ordinary labor and supervision. This collective group did exceptionally good work, mostly due to the excellent organization of the Carpenter Shop, which in reality was a pre-fabrication mill. Equally as well performed was the work of the Utilities group where experienced supervision and skilled technicians contributed greatly, even though handicapped by the volume of work and the steady increase in population.

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ISCOM Light Aviation Section was in operation twenty (20) hours after both L-4's were unloaded from the USS Yancey on 26 December 1947. The need for light aircraft was substantiated by the record passenger and cargo runs made. A separate chapter is incorporated in this report on the operation of the Light Aviation Section.

In addition to the above mentioned assignments, sixteen (16) additional lesser projects were ordered by JTF Engineer to be installed on Parry and Eniwetok Islands were performed under the direction of the ISCOM Operations by collective groups from all units organized to rehabilitate Eniwetok.

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CHAPTER VI
LOGISTICS & SUPPLY

Supply for the operation was excellent, despite numerous difficulties resulting from the rapid organization of JTF-7 and its heterogeneous composition.

At the inception of TG 7.2 it was planned to have one supply account for Eniwetok Atoll. The account number assigned by USARPAC was GP-285, and 1st Lt Thomas Hall, CAC, was designated the accountable officer, as well as S-4 for the 1220th Prov Engineer Battalion. All supplies and equipment requisitioned prior to 15 Dec 48 for the operation were shipped to this account. It soon became apparent that this method was unsuitable, due to the scope of the task and the technical difficulties involved. Accordingly, each supply cell of the 1220th was assigned an account number. The following shows the account number assigned, and the officers assigned by Special Order No. 4, ISCOM Headquarters, dated 8 January 1948:

<u>AGENCY</u>	<u>ACCOUNT NO.</u>	<u>ACCOUNTABLE OFFICER</u>
QM Supply	AP-286	1st Lt Howard E. Sharples
Ordnance Supply	AP-287	Capt Jacob P. Bergman
Signal Supply	AP-288	Maj Paul H. Rittenhouse
Engineer Supply	AP-289	CWO Clifford L. Champ
Medical Supply	AP-290	1st Lt Jack R. Fuqua
Chemical Supply	AP-291	Capt Jacob P. Bergman
Special Service Supply	AP-292	Capt J. C. Owens
Transp Corps Supply	AP-301	1st Lt Lenz F. Kreger

Upon the arrival of the 2d E.S.B. units, the supply and property accounting situation was in a state of chaos. Many supplies and much equipment, which had arrived during December, was still on the beach. The small supply cells of the 1220th Prov Engr Bn were striving to rectify

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the situation, to clean and repair warehouses, and to set up property accounts.

Due to the urgency of the work, each unit on the atoll took what supplies and equipment it required from the beach dumps, further complicating the organization of an accounting system. On December 26th, Major DeMelker was appointed Director of Supply, along with the following staff personnel:

Capt Peter F. Wolfe	Asst S-4
CWO Roy W. Ligon	Asst S-4
M/Sgt James V. Forsythe	S-4 Supply Sgt
S/Sgt John W. Brechtbill	Asst Supply Sgt
S/Sgt Van D. Bell	Clerk
T/5 Delmos O. Dubberly	Clerk

At this time 19,000 M/T of supplies were already ashore, with 7500 M/T afloat, and an additional 15,000 M/T due within a week. Much of the cargo consisted of highly specialized items foreign to most military personnel, and items especially constructed in the rear areas for specific purposes. To prevent delay, it was of the utmost importance to route these items to the correct installations, islands and units.

Action was taken to obtain troops from the 532d EB & SR, to repair the warehouses and to move all the equipment and supplies from the beaches to the proper technical agencies' warehouses. This work was performed by detachments of "D" and "E" Companies, 532d EB & SR.

Engineer Maintenance responsibility was assigned to Captain Nevio Petrini, the Regimental Maintenance Officer of the 532d EB & SR. The Engineer Maintenance Platoon of the 532d EB & SR, commanded by 1st Lt Harry Halford, was very well equipped and supplied with spare parts prior

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to departing the Z.I. An additional supply of spare parts, brought from Oahu by the 18th Engineers Construction Company, were turned over to the Maintenance Platoon. In general, the Engineer spare parts proved to be adequate except for gaskets and oil seals, which were air shipped from Oahu from time to time. Due to the concentration of engineer equipment on the zero islands it was decided to locate the platoon at Runit Island, which proved to be an ideal location. The platoon was moved back to Eniwetok the first part of April. The Engr Maint Platoon and an adequate stock of spare parts proved to be invaluable in the accomplishment of the Engineer Companies' mission.

The Ordnance Maintenance Detachment of the 1220th Prov Engr Bn, commanded by Capt Jacob Bergman, consisting of one Officer and forty EM, was responsible for all maintenance of ordnance and QM equipment above second echelon repair. This Detachment was well organized and operated very efficiently from Eniwetok Island. The supply of spare parts for ordnance equipment was, in general, adequate, except for a few items such as seals, gaskets, and clutch plates. The available supply of spare parts for the QM cargo handling equipment proved entirely inadequate; consequently a large quantity of this equipment was returned on early shipping as unserviceable. An adequate supply of parts for this equipment would have precluded this action, and alleviated the acute shortage of cargo handling equipment. This shortage was somewhat relieved by the receipt of additional forklifts from the Oakland Army Base, which were shipped on the last supply turn-around of the USS Yancey.

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Distribution of supplies to the outlying islands was accomplished by small boat, and, in many instances, by liaison planes. The Embarkation Section of Hq 532d EB & SR, which was composed of 1st Lt John J. Kentzel, 1st Lt E. C. Murphy, and S/Sgt Lester Edgar, was responsible for the local movement of supplies. The Embarkation Section manifested the cargo, arranged for small boats from the mobile boat pool, and supervised the outloading and delivery. This required the coordination of a myriad of details, but, despite this fact, this system worked very efficiently.

On 1 February Majors C. D. Waldecker and W. K. Simons, and CWO C. W. Wallis of the USARPAC Audit Agency arrived to advise the supply officers in proper accounting procedure. Many deficiencies were noted, due to lack of, and/or improper documentation of the supplies from the rear areas, and lack of experience on the part of some of the personnel. These deficiencies were pointed out to the officers concerned, and action was taken to obtain shipping documents from the supply sources. About 6 March photostatic copies of shipping documents were received for items shipped through NAB Pt Hueneme, California.

Port operations were then organized under the Port Director, Major Osver Gibson. A system of cargo tickets was instituted, whereby each item off-loaded was identified by the Port Reference Number, and a signed receipt was obtained from each Consignee. Due to the highly classified nature of the project, many of the items could not be readily identified, nor could the Consignee be determined. Consequently, numerous items were misdirected, but due to the cargo ticket system, it was an easy matter to determine the possessor of the item in question, and adjustments were made

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accordingly.

Captains Joseph Waits and Earl B. Fauber, and Lt Harry G. France, of the JTF-7 Engineer staff, who were instrumental in procuring the supplies were of invaluable aid in routing the supplies to the proper projects.

By the end of January the supply agencies were well-organized and functioning, receipts of supplies from incoming ships were being routed through the proper depots, and most of the supplies consigned to GP-285 and the supplies from Navy sources were broken down to the proper supply accounts. However, shipping documents were not received initially for over 90% of the supplies. Stock Record accounts were set up from Ships' Manifests, and many items were picked up on Inventory Adjustment Reports.

Re-supply was handled from each supply agency, through the Base S-4 to USARPAC. Emergency supplies were requested by radio, followed by confirming requisitions to the appropriate USARPAC depot, through J-4 at Oahu. Items not available at Oahu were requisitioned on the ZI by wire. A large percentage of the supplies were shipped by air freight. The larger and heavier items were shipped by surface lifts, which were scheduled every fifteen to twenty days throughout the operation.

The CG, TG 7.2 was responsible for outloading all troops and equipment on Eniwetok Atoll. In the roll-up the property and expendables were, in general, returned as follows:

- a. Unit EML equipment and property was returned to the unit's home station, with surpluses to the depots.
- b. Other Armed Forces property and equipment to the source of origin, except as otherwise directed by the Forces concerned.

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c. Expendables to Oahu.

d. AEC property to San Francisco, Calif.

Of the 35,000 M/T shipped to the Eniwetok area, approximately 5,000 M/T were returned prior to "Z" day, and a total of 12,000 M/T was shipped out in the final roll-up. Depot accounts were inspected by the USARPAC Audit Agency and the USARPAC Inspector General, and forwarded to Hq, JTF-7 for final auditing and disposition.

Early in the operation it became evident that some garrison force would have to remain in the Eniwetok area, subsequent to the tests, for surveillance of the zero islands and maintaining possession of the Atoll. Various plans were discussed and considered, among which three primary proposals were: A ship-based detachment, to be rotated periodically from Kwajalein; A force of 250-300 Engr Troops to perform some construction work for future tests while garrisoning the Atoll; and a force of 50 men, based on Eniwetok, to perform surveillance of zero islands by means of LCM or L-5 trips.

The three proposals were presented to General Hull during one of his early visits. After discussing the matter with the individuals concerned, General Hull requested the CG, TG 7.2, to make recommendations for a garrison force approximating 50 personnel, along with the tables of allowances and equipment, and to prepare Eniwetok Atoll for this garrison. Accordingly, a tentative T/O & E and T/A was prepared by the Base S-4, which was submitted to CG, USARPAC early in February.

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CHAPTER VII

PORT ACTIVITIES

This chapter has been omitted since port activities are covered in the report of the Transportation Officer, Joint Task Force Seven.

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CHAPTER VIII

SECURITY

Personnel assigned to the 401st CIC Detachment, Oahu, T. H., comprised the nucleus of the Security Force for JTF-7 forward. Upon the arrival of the first troops on 28 November 1947 under the guidance of Capt Clifford E. Orbesen and 2 CIC agents the first Security Office was established. This group, because of a change in administrative policy, was replaced on 13 December 1947 by another unit from the 401st CIC Detachment consisting of two officers and two Special Agents. This detachment under the command of Capt George H. Carr Jr was assigned the following missions:

1. Travel Control - Air and Water
2. Protection of Technical Installations
3. Security Survey of the Atoll
4. Dissemination of Security Information
5. Establishment and Implementation of a program for obtaining "P" and "Q" clearances in the forward area.
6. Establish a foundation for further Security Control

In order to accomplish the above assigned missions Capt Carr assumed the role of Security Officer ISCOM, TG 7.2, APO 187.

Although the job of Travel Control, consisting of briefing all incoming and outgoing passengers (both air and water) on Joint Task Force Seven security regulations and a thorough baggage inspection of all personnel was handled efficiently. It soon became apparent that in

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order to successfully accomplish the remaining tasks a greater number of personnel would be required, consequently a request was sent to Headquarters JTF-7 for additional personnel.

On 8 January 1948, six Special Agents assigned to the 700X CIC Detachment reported to Capt Carr and were assigned the task of implementing the Clearance program.

Shortly thereafter, on 12 January 1948, nine additional Special Agents from the 401st CIC Detachment arrived. Four of these agents under Capt Clemmon F. Munn were instructed to conduct the initial Security Survey which entailed, (1) determining a method of landing on each island, (2) inspecting each island, (3) establishing a schedule of inspection for each island. The four remaining CIC agents were assigned as Resident CIC Agents, one each to Engebi, Aomon, Runit and Parry.

By 24 January 1948 upon the arrival of 1st Lt Joseph Miceli accompanied by 2nd Lt Joseph R. Cruciani and 33 MP enlisted personnel the security unit actually became a force. This group of MP's was utilized to strengthen our security units on Engebi, Aomon, Runit and Parry.

Late in January 1948 regular security sweeps of the Eniwetok Atoll were begun in which security personnel stationed on Engebi became responsible for sweeping the NW group of islands, security personnel on Aomon became responsible for sweeping the NE group of islands while the SE and SW groups of islands were checked by personnel stationed on Eniwetok.

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On February 1948, when Capt Carr was relieved by Lt Col Philip R. Cibotti, Jr., CTG 7.5, all assigned missions were being accomplished in that; (1) An efficient Air Travel Control Program had been implemented; (2) All technical installations were adequately safeguarded; (3) The original security survey had been completed and periodic sweeps were being conducted; (4) The Forward Area "P" and "Q" clearance program was 90% completed; (5) Security Information had been disseminated in that all troops were adequately informed regarding Joint Task Force Seven security regulations.

Although problems were for the most part minor and administrative in nature, the following observations are made:

1. The number of CIC agents could be reduced since the majority of duties assigned were not CIC in nature.
2. In lieu of organized CIC Detachments, a few agents could be assigned to the staff of the Joint Security Group Commander.

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CHAPTER IX - FINANCE

The first echelon comprising 1 Officer and two enlisted men arrived at APO 187 on 18 December 1947. Office space was procured on the ground floor of Headquarters building, 1220th Provisional Engineer Battalion. The Finance Office was activated on 21 December 1947 as a Class B Agent Office with the Disbursing Office, Hickam Field, Oahu, T.H. as parent office. One additional EM reported for duty on 24 December 1947. One other EM reported for duty on 7 January 1948.

ORGANIZATION: Duties were assigned as follows:

The one Officer assumed duties of general supervision, acted as his own Cashier, and audited all vouchers prior to payment.

One M/Sgt was assigned duties of Chief Clerk and Mileage and per diem clerk.

One S/Sgt as Officers' Pay and Allowance clerk.

One S/Sgt and one Sgt as clerks in Enlisted Pay section.

POLICY: To contribute to the success of operation Sandstone by performing in such a manner so that prompt payment of all pay and allowance accounts of the personnel involved could be accomplished with the least possible delay in order that construction and other personnel might devote their energies entirely to their individual tasks.

PROGRESS THROUGH "P" DAY: At date of activation of the office an authorization was granted to keep \$20,000.00 cash on hand, but because

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of the increase in personnel, authorization was obtained to keep \$75,000.00 cash on hand. Additional increases in personnel necessitated further authorization to keep \$125,000.00 cash on hand. Because of the distance from the Finance Office to the depository (approximately 2800 miles) it was necessary to arrange to have Postal and Army Exchange cash receipts turned over to the Finance Officer and Treasury Checks issued by the parent Disbursing Office. This resulted in a lapse of some ten to fifteen days in the rendition of reports and returns by the Postal Officer and the Army Exchange Officer but eliminated the necessity of frequent trips to the depository for funds with which to make payments.

The payment of all enlisted pay rolls and Officers' pay and allowance accounts were accomplished on time each month.

Comparative Statement of expenditures by month from 21st to 20th:

21 December 1947 to 20 January 1948	\$ 118,270.84
21 January 1948 to 20 February 1948	137,610.55
21 February 1948 to 20 March 1948	139,902.86
21 March 1948 to 20 April 1948	<u>156,860.87</u>
Total expenditures (4 months)	\$ 552,645.12

The above does not include payments by check made by the parent Disbursing Office to personnel of the Island Command at Eniwetok.

RECOMMENDATIONS: It is recommended that, should a similar operation be undertaken at some future date at a great distance from a Depository as is this one, there be established an accountable Disbursing Office in order that official business might be transacted more expeditiously.

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COMMENTS: Because of the lack of equipment, regulations, technical manuals, and reference books, the personnel were prevented from accomplishing the mission as ably as would have been possible had such items been available. Had not the personnel engaged in finance activities on this operation possessed broad technical knowledge and skill it is doubtful that the mission could have succeeded as well as it has.

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CHAPTER X

QUARTERMASTER AND ORDNANCE

On 29 November 1947 the QM SUPPLY TEAM, one officer and 19 EM, landed on the island of Eniwetok. After being assigned the Warehouse Area, the team prepared all warehouses for the receipt of supplies. In addition to the warehouses, a Reefer Bank, consisting of 33 boxes, was put into operation a few at a time, depending upon the work of the Utilities. Within two or three days after all personnel had landed the flow of supplies began. Four warehouses were set up for Subsistence, one for C & E, three for General Supplies. The flow of subsistence was too fast on the unloading end and could not be handled efficiently on the receiving end with only 18 men.

Freeze and chill items were received in small amounts at first, later to be increased as more cold storage room was put into operation. In addition to all Army QM supplies, the team also had to handle all Navy (QM) items. These items were set aside in a separate warehouse and outside area for issue. Most of this equipment was for galley use with some general supplies in addition.

The QM Supply Office was set up and first issued T O & E equipment to the Technical Units and furniture for Island Command Hq. The month of December was given over entirely to receiving and setting up QM Supplies in the area. For Christmas and New Year's a Special Menu was prepared for the messes and extra effort put forth by all concerned to make the Dinner meal attractive and palatable.

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During the month of January, 1948, the delivery of subsistence, by mobile reefer truck, was set up for three other islands in the Atoll. This delivery service of freeze, chill and dry stores was scheduled for twice a week and remained on that basis until "P" Day. For the months of January, February, and March, the QM supply operated on a routine schedule of receiving (by either water or air), storing and issuing of supplies for this Project.

The C & E supplies were set up on a replacement basis for 100 men for six months. This supply was not sufficient after the 532nd EB & SR Units and other small teams arrived from the ZI with but a ninety (90) days supply of clothing and equipment. Therefore it was necessary to requisition additional supplies for this need. For the convenience of Officer personnel, both Army and Navy, an Officer's QM Sales was set up in the C & E warehouse and did a worthwhile business.

In March the QM handled all the added supplies which were shipped in for the setting up of JTF 7 on shore. This included mostly office furniture and stationery supplies.

Directly after the first of April, a start was made on the Roll-up plan by out loading excess QM Supplies to Z.I. and T.H.

A laundry trailer was brought ashore on the 8th of December 1947. It was damaged while being unloaded, and it was a week later on the 15th of December before the laundry was in operation. At that time it was not operating at peak efficiency due to the damage sustained while being unloaded. However, the laundry trailer operated from the 15th of

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December up to April 8th. There were not adequate laundry supplies such as bleach, snow, bluing, and soda ash, needed especially for the laundering of bed linen and white clothes.

The laundry officer from USARPAC, Major Starker, arrived the 11th of March to give the benefit of his training and experience.

The only recommendation he made was to use a water softener, as the water on this island (according to his test) was of a 7 points hardening content. This was immediately done and a noticeable improvement of the quality of laundry occurred. The boiler on one of the units was causing a lot of trouble by developing leaks around the boiler tubes and it caused a shut down of approximately a week from the period of 29th March 1948 to 4 April 1948.

After the leaks were repaired the boiler was put back in operation and the laundry again went back on a 24 hour per day schedule. One difficulty in the operation was the lack of spare parts to keep the units running and also the condition they were received in, especially the first laundry trailer received.

Due to the secrecy involved in the movement it was difficult to find out the type of water to be used, which is always an important factor in the operation of a laundry. When the unit was formed the laundry officer was told he would operate with fresh water.

Also due to the fact that the operation was in a forward area it is recommended that a 50% overage in laundry equipment above normal needs, be included due to unforeseen breakdowns. It is further recommended that only new trailers, or ones that have been completely reconditioned be shipped on such operations as this.

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The Ordnance Maintenance Team was formed in October 1947. The personnel was detailed from various organizations of Ordnance Service in Honolulu. It consisted of one (1) officer and twenty-seven (27) enlisted men.

The team boarded LST 45 November 15, 1947 and arrived in Eniwetok 1 December 1947.

On arriving on the beach the duty of the Ordnance Maintenance Team was to service and maintain all Ordnance vehicles.

The team set up a complete third echelon automotive shop. Also set up a motor pool dispatching approximately seventy-five (75) vehicles.

Upon the arrival of 532nd EB & SR the maintenance of approximately one hundred twenty-five (125) vehicles fell on the Ordnance team.

With the arrival of A.E.C. additional fifty (50) vehicles were added to the maintenance roster.

When the close of the project is ordered the maintenance team will process all vehicles for shipment.

To date the team has completed one thousand twenty-seven (1027) jobs orders of various nature.

The Ordnance Supply team of the 1218th Composite Service Platoon, 1220th Provisional Engineer Battalion; under the leadership of Lieut. Robert W. Weeks and Technician Fourth Grade John A. Chaffin landed on Eniwetok on 29 November 1947. This team consisted of 19 men and one officer. Their mission on this task force was the storage and issue of Ordnance Automotive parts, both second and third echelon. By Christmas 1947, the supply warehouse had been put in operating con-

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dition, bins constructed and most of the parts had been located in the proper bins. On January 2, 1948, Lieutenant Weeks became ill and was evacuated to Oahu; Captain Jacob P. Bergman, the maintenance team commander, was made accountable officer of account AP-287 until a replacement for Lieutenant Weeks could arrive from Oahu. On 9 January 1948, Lieutenant Otis H. Rodgers arrived and was made accountable officer of account AP-287. In late January, enough weapons and ammunition arrived to equip every man on the atoll. These were issued in three days by Ordnance Supply. Around 15 March 1948, the LST 611 arrived from Oahu with a complete re-supply of parts for Ordnance Supply; there were 1100 boxes of parts to be opened, posted, and binned. In addition, 37 vehicles were also received, including light sedans. Upon completion of the binning of this new shipment of parts, regular depot operations were carried out until "P" day.

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CHAPTER XI

LIGHT AVIATION

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CHAPTER XI
LIGHT AVIATION

Two L-4's were finally decided on as the liaison aircraft equipment to accompany the 532nd EB & SR on Operation Sandstone. The aircraft were crated and loaded aboard the USS Yancey on or about 8 December, 1947, accompanied by Lt George R. Lightkep, Liaison Pilot and T/5 Melvin F. Granger, the aircraft mechanic.

The USS Yancey dropped anchor in Eniwetok lagoon on 24 December, but due to the Christmas holiday, the unloading of the aircraft was postponed until 26 December. A warehouse on the northern side of Stickell Field on Eniwetok was assigned as a hangar. Lt. Anton F. Vaitonis, OIC Liaison Section and pilot, and T/4 Merle P. Welling, aircraft mechanic arrived aboard the USS Pickaway with the main body of troops of TG 7.2.

On 30 December, the first L-4 was test hopped and found to be in excellent condition. This was the result of proper precautions taken in the preparation, crating and shipping. The warehouse assigned to the Air Section, then known as ISCOM Light Aviation, was completely rehabilitated by the small force of two pilots and the two mechanics, using borrowed equipment. By removing one end of the warehouse, it was possible to construct a hangar. On 2 January, 1948, the second L-4 was test hopped and also found to be in excellent condition.

On 3 January, the ISCOM Light Aviation Section was in full swing and the beginning of the steady air transportation, interrupted only

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by weather, normal maintenance checks, the lack of spare parts and two mishaps which did not result in serious damage. In view of the handicaps, no appreciable decline resulted in transportation, for the pilots spelled each other in order to maintain continuous operation.

The need for rapid air transportation was realized from the first day, when a call for critical parts from one of the islands was answered with a delivery made by aircraft just thirty minutes after the call was received. The only other means of transportation, was by boat, which required hours of travel after it was loaded. One disadvantage, however, was the limitation on weight and bulk that could be carried by the L-4 type aircraft.

Following the dispatch system used by the 2nd ESB, Fort Worden, a priority system, controlled by the ISCOM S-3, was adopted, using the following precedence of travel requirements in decreasing order of priority: Emergency evacuation of injured sick, delivery of critical construction parts or special maintenance personnel, AEC advisors and Scientists, mail and VIP. Flight clearances were made by phone to Eniwetok Air Base in accordance with traffic regulations prescribed for local flights.

In view of the growing demand for flights, CTG 7.2 requested a total of twelve additional Navy and Air Force aircraft from JTF 7. The existing aircraft were operating continuously from sun up to sun-down and maintenance checks were performed during the night to take

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advantage of all day light hours for flying. L-4 aircraft are prohibited, by AAF regulations, from operating after official sundown.

On 10 January, the first mishap occurred when high winds nosed over one of the L-4's, leaving it with a broken propellor and a damaged airscoop. Most of the limited stock of parts on hand were exhausted to overhaul the engine of the wrecked L-4, taking advantage of the waiting time for the new propellor and airscoop to be delivered from Oahu. The remaining L-4 stayed in service and maintained the record under a strain of continuous flying done by the two pilots. During this time maintenance checks were more frequent because of the steady operation of the one aircraft.

The use of MOGAS, which was later found to be contaminated with diesel fuel, resulted in having to overhaul the engine in the L-4 which was in operation. While performing maintenance on this aircraft, parts were transferred to make the other flyable. As soon as the overhaul was completed the aircraft was put back into operation while the other awaited parts. Numerous wires were sent to expedite delivery of the urgently needed L-4 parts, without visible results.

Arrangements were made to obtain one L-5 and one OY-1 both inoperable, from Kwajalein with the hope of making one flyable aircraft from the combined parts of both. Both planes were shipped from Kwajalein to Eniwetok and the preparation of the OY-1, the better of the two, was begun immediately. While assembly of the OY-1 was progressing, word was received that additional aircraft were being shipped to meet the

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growing need for air travel. Pilots and mechanics were scheduled to arrive about the 15th of February to operate the additional aircraft. Another warehouse, adjacent to the one already being used as a hangar and twice as long, was prepared to house the other aircraft. A fuel point was established, with a capacity of 1000 gallons, about 1 February to ease the work of fueling the aircraft. Prior to this time the aircraft were being refueled by means of five gallon cans.

On 5 February, the USS *Passig* arrived with four (4) OY-1 aircraft, deck loaded. The aircraft were exposed to salt spray, which resulted in damage to those parts not protected by preservative. One of the aircraft had broken loose from its moorings while at sea and caused major damage to one other aircraft before it was secured again. Spare parts were supposed to have been sent with the above aircraft, but none arrived at this time. Work was immediately started on the least damaged of the newly arrived planes while the rest of the aircraft were stored in the hangar. It was necessary to cannibalize the worst damaged of the aircraft in order to make others flyable, due to lack of parts. No parts had yet arrived for the L-4's and all possible missions were flown down by the one L-4. The pilots and mechanics worked as a team in order to get additional aircraft into the air. On 7 February, the first OY-1 was put into operation after a test flight and this gave the Air Section one L-4 and one OY-1 to use in completing their mission.

The second mishap occurred on 10 February, when Lt. Vaitonis attempted a test landing with an OY-1 on Runit Island. Since no previous

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landing had been made in this type aircraft Lt. Vaitonis recommended that no passengers would accompany him on this flight, due to the limited runway and the peculiar surroundings. While attempting to land, the landing gear stuck in the soft sand on the approach end of the strip and resulted in appreciable damage to the aircraft. An accident Investigating Board exonerated Lt. Vaitonis and made several recommendations; that because of the glare caused by the rising sun on the water, no aircraft would be landed at Runit prior to 0900 hours and that certain repairs be made to the runway.

While all the missions possible were flown by the two pilots, the two mechanics continued to assemble the remaining planes. The mechanics continued to do most of the maintenance at night on the flyable aircraft, in order to allow as much flying as daylight hours permitted.

On 15 February, four additional pilots arrived to augment the Air Section and Captain A. C. Sebourn assumed command of the Liaison Air Section.

On 20 February, four additional mechanics arrived giving the ISCOM Light Aviation Section a total of six (6) pilots and six (6) mechanics. Work was continued in the assembly of the planes and it was possible to put another aircraft into the air, giving the air section a total of three aircraft.

Much of the maintenance problem that presented itself at this time was the failure of the Aero-Matic propellers that the OY-1's were equipped with. These propellers were found unsatisfactory because of the maintenance they required. The average propellor lasted

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about twenty to thirty hours before it became unserviceable.

On 16 March, an Air Force Liaison Air Section arrived at Eniwetok, consisting of two (2) Officers, five (5) Enlisted pilots and seven (7) mechanics. Capt. Crysler of the Air Force took over command of the combined Air Section, relieving Captain Sebourn. Upon arrival at Eniwetok the Air Force Liaison Air Section found awaiting them a complete hangar and facilities for their aircraft, a fueling point, an operations office and three aircraft in operation with four more just awaiting propellers and hubs.

From their supply of parts, the Air Force Liaison Air Section furnished the needed propellers and hubs. This placed thirteen aircraft in operation shortly after their arrival. The Air Force had brought six (6) L-5's with them; these with the seven belonging to the ground forces, brought the total up to thirteen flyable aircraft.

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CHAPTER XII

ENIWETOK AND PARRY ISLANDS

The principal island of Eniwetok Atoll is Eniwetok Island, which is also the largest of the group. Because of its size and geographical location most of the structures were installed on Eniwetok itself after the atoll was captured during the last war. The island is covered with barracks, warehouses and shops except the area where the present airfield, taxiways and parking areas exist.

The existing buildings and installations were found in poor condition by the advance echelons of TG 7.2 which arrived during the latter part of November 1947. This group consisted of sixteen Navy utilities personnel and two civilians - both of the U. S. Army's Mechanical Advisor Service, working out of USARPAC - who arrived by plane on 20 and 21 November. An attempt was made to rehabilitate, or salvage, some of the existing installations and deadlined equipment left on Eniwetok. One small distillation unit was put into operation and one large 100 KW diesel generator was running spasmodically when the first troops arrived on 29 November. The rapid deterioration of equipment exposed to the salt air and heat dimmed any hopes, which might have been held, that a great amount of equipment might be placed in immediate operation upon landing.

On 29 December, at a staff meeting held in ISCOM Headquarters,

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TG 7.2, it was decided to rehabilitate as many existing structures and installations on Eniwetok as could be used to provide service or shelter for the operation. From this island the Service units would provide support for the construction units located on Engebi, Aomon and Runit.

Parry Island, in close proximity to Eniwetok, where the marine cable laying detachment's activities were centered and controlled, was occupied by TG 7.3.6 and Navy Signal Detachment #1. Upon arrival of the USS Gardners Bay (AV), the Navy Air activities were centered at Parry using an existing seaplane ramp and other facilities to expedite their maintenance. The Navy cable laying group, Navy Signal Detachment #1 and the Navy air group had only technicians for their projects and the necessary housekeeping personnel. Therefore, to rehabilitate Parry Island, it was necessary to further tax Company "D," 532nd EB & SR for the necessary help in men and equipment to construct, install and rehabilitate the initial set-up, after which the construction on Parry would become the responsibility of the Repair and Maintenance Section on Eniwetok.

On Eniwetok, rehabilitation of quarters to house all the units present on the atoll was necessary, even though thirty-five percent of the population were housed on Engebi, Aomon and Runit. This would enable all units to assemble after evacuating the test grounds. In addition, quarters were made available for inspection teams, VIP's and the influx of Air Corps personnel. The Utilities Section and the

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Carpenter Shop labored continuously installing, repairing and maintaining facilities to provide not only the essential needs, but expanded and improved to provide comfort wherever possible.

CHRONOLOGICAL REPORT OF HEADQUARTERS COMPANY, 532nd EB & SR

The second part of this chapter is divided into a chronological report of Headquarters Company, 532nd EB & SR, which provided either the supervision, the manpower or the administration for the general duties on Eniwetok and Parry.

Upon the assumption of the additional duties prescribed by higher headquarters, the following picture of the functions of the sections of Headquarters Company is presented. Orderly Room personnel were responsible for administration of Headquarters Company plus two hundred and fifteen (215) additional personnel; Supply Section was responsible for the normal supply problems plus the added burden of the aforementioned added personnel; Mess Section was responsible for the operation of a consolidated mess feeding between seven hundred (700) and thirteen hundred and fifty (1350) enlisted men; The Communications Section was used extensively as a utilities section in the maintenance, repair, renovation and construction buildings after their initial communications jobs were completed. In addition, enlisted men were requested for the maintenance of distillation units and large generators and additional clerks had to be supplied for the S-1, 2, 3, and 4 Sections of ISCOM Headquarters.

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Although it was immediately undertaken to furnish these permanent details of skilled personnel, it was apparent that the company could not meet the demands made upon it, and function in its normal capacity, without additional personnel.

Additional personnel were obtained from the line companies of the Regiment and the company was reorganized to an extent which enabled it to carry out successfully, all job assignments.

After the initial debarkation, the troops were given their barracks assignments and unloading details were set up which worked until 2400 hours that night. The three succeeding days were spent in completing the unloading of supplies and equipment. During this period, a major portion of the mechanics, welders and electricians of the Heavy Maintenance Section were sent to the Islands of Runit and Aomon to work with the line companies of the Regiment.

Staff section personnel found themselves at this time taking on a much heavier load than they had previously handled, due to the fact that the sections were doing double duty by handling the ISCOM business as well as that of the Regiment.

On 2 January 1948, two Officers and twenty-nine enlisted men from Company "E," 532nd EB & SR and two Officers and twenty-four enlisted men from Company "D," 532nd EB & SR were assigned to Headquarters Company, bringing the assigned strength up to one hundred and forty-seven (EM). The major portion of the newly assigned personnel not absorbed into the various staff sections were assigned to the Regimental Motor Pool as drivers, and into the LCVF and LCM boat sections as coxswains, engineers and seamen.

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On 5 January, the radio telephone system not yet having been established, radio operators of the Headquarters Company Signal Section went to Companies "D" and "E" of the Regiment to maintain an inter-island communication system; equipment used for this operation was a SCR 399, as a base station on Eniwetok, and a AN/GRC 9 on each of the other islands. This net continued in operation for three weeks and proved of great value to all concerned. Upon the opening of the radio telephone service between the islands, the Headquarters Company net was closed and the operators on Aomon and Runit Islands returned to Eniwetok.

On the night of 15 January, at approximately 1900 hours, a fire broke out in the kitchen section of the Bomber Mess Hall, and in a very few minutes the entire kitchen building was in flames. The destruction of the kitchen and a major portion of the equipment therein necessitated the establishment of a temporary kitchen in a building close by the mess hall, utilizing the units field ranges for the cooking of foods and heating of water. Immersion heaters were brought into use for the cleaning of pots and pans and the washing of mess gear by the troops.

During the second week in February, it was decided to utilize the men in the Signal Section, now without any signal duties, in the formation of a utilities section to handle whatever work projects that should be assigned by Base S-3. These men, with the exception of the NCO's in charge, were inexperienced along construction lines. However, these

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men, without an exception, fell to work and for over two months were employed with highly creditable results in the razing of buildings, renovation and painting of quarters, construction of showers and latrines and the painting of shops, warehouses and other installations to be used by the permanent garrison.

In a summary of the efforts of the utilities section the following information is furnished:

North end of island: Five barracks buildings completely renovated with four man private rooms installed in same; one complete combination shower and washroom, concrete floor; one deep, concrete pit, latrine.

Bomber Mess area: Five barracks buildings renovated, with new floors installed in three buildings and new roofs on two; one complete combination shower and washroom with wood piers and flooring; twelve buildings (quarters and offices) painted inside; nineteen buildings (quarters, offices and sanitary facilities) painted outside; miscellaneous work on twelve buildings.

Central portion of island: Two barracks type buildings and three shop type buildings, on present site of AEC vault, razed and pushed into the ocean; one complete building, floor shed type, moved from vehicle dump to present site of AEC vault.

In addition to the projects listed above, Headquarters Company personnel made up the details to construct a boxing ring at the service club, clear away abandoned vehicles from the salvage yard

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and prepare revetments for the use of the drone test planes, construction of a drone plane stop on the end of the airstrip, the removal of pierced steel matting from the revetment area and erection of a fire and alert siren on the water tower at the Bomber Mess.

TECHNICAL DATA FROM OPERATIONAL REPORTS.

Construction on these islands, Eniwetok and Parry, was performed by detachments from Headquarters Company, 532nd EB & SR, stationed on Eniwetok. Technical requirements were relatively few and simple. Pressure of time did not ordinarily permit the drawing and reproduction of detailed plans, and work was carried out by means of penciled sketches, verbal instructions and **on-the-spot decisions**. As most of the work was not critical with regard to holding to precise dimensions, this arrangement worked well and resulted in considerable saving of time. A brief description of each project is deemed sufficient to present the picture.

Control Station (Parry Island). Requirements existed for the construction of an air-conditioned room, 12' x 12' x 8', elevated to a height of approximately fifteen feet.

Reflector Tower (Parry Island). Requirements existed for the erection of a wooden tower fifteen feet in height, strong and large enough to support two thirty inch searchlight reflectors.

Telemetering Installations (Parry Island). Construction to satisfy these requirements consisted of rehabilitating an existing Quonset Hut, installing electric generators, placing guy wires on a 100 foot steel Navy Survey tower, string strands of co-axial cable to the top

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of the tower and placing a twenty-two foot wooden antenna mast atop the 100 foot tower.

Seismograph Stations (Parry Island). Two stations were placed on the island as far apart as was possible geographically. The azimuth to Runit Zero tower was computed. Both stations were tied into the Control Station by ditched two conductor wire, involving about 7800 feet of ditching.

Drone Operation Requirements (Eniwetok Island). The drone operation requirements consisted of a radiochem laboratory, drone arrestor gear and parking slots and drone control installations.

The work on the radiochem laboratory consisted of rehabilitating an existing Quonset hut, installing work benches, utility outlets, generators and a water supply.

The drone arrestor gear consisted of a series of ditches across the north end of the main runway and also required installation of a series of deadmen on the side of the runway for the attachment of nylon ropes. To protect parked planes from drones out of control, four barricaded parking slots were constructed.

Drone control installations involved the construction of a drone control platform, two searchlight platforms, rehabilitation of a Quonset for an electronics lab, marking of the airstrip center line, marking a twenty foot wide caution strip across the runway and marking of taxi-ways on the apron.

AEC Vault (Eniwetok Island). A reinforced vault for temporary storage of the weapon was constructed.

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Film Storage (Eniwetok Island). Approximately 250 cubic feet of air conditioned space for the storage of photographic supplies was provided.

Listed is a compilation of starting and completion dates and man hours expended on the projects described:

<u>PROJECT</u>	<u>STARTING DATE</u>	<u>COMPL DATE</u>	<u>MAN HOURS</u>
Control Station (Parry)	16 Feb	25 Feb	524
Runway Barrier (Eniwetok)	12 Mar	14 Mar	160
Evaluation Lab (Eniwetok)	9 Feb	1 Mar	240
Hartmans Lab & Warehouse (Parry)	25 Feb	26 Feb	74
Drone Control Station (Eniwetok)	2 Mar	16 Mar	1000
Storage Vault (Eniwetok)	6 Mar	16 Mar	1542
Photographic Building (Eniwetok)	2 Mar	17 Mar	144
Electronic Bldg for Drone Control (Eniwetok)	2 Mar	7 Mar	60
Drone Storage Slots (Eniwetok)	3 Mar	13 Mar	300
Airstrip Center Line (Eniwetok)	2 Mar	23 Mar	20
Road Oiling for Dust Control (Eniwetok)	3 Mar		100
Office Space for TG 7.1 (Eniwetok)	23 Mar	25 Mar	64
Mast on 100' Tower (Parry)	22 Mar	24 Mar	22
Hartmans Lab #2 (Parry)	22 Mar	22 Mar	4
Searchlight Tower (Parry)	23 Mar	24 Mar	85
Dark Room (Parry)	25 Mar	25 Mar	16

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WATER SUPPLY

1. Eniwetok: Initial garrison was using rain water. Within 48 hours after advance party arrived, Mr. Hall and H. L. Bowman Lt (jg) U.S.N. had taken an old 1200 GPD Badger distillation unit from the salvage line, overhauled it and put it into operation.

On the first LST a 6000 GPD Meco Diesel distillation unit was unloaded and within 8 hours of locating it on a marginal pier, canvas 3000 gallon tanks were set up and the unit put into operation by an Engineer water team from the Hawaiian Engineer Water School of four men and Mr. Hall, Engineer Mechanical Advisor from the same school.

Three Cleaver-Brooks 3000 gallons per day stills were next installed temporarily at the old still site near Officers Mess. This installation was completed within five (5) days after arrival of the first LST.

A permanent bank of 12 Cleaver-Brooks stills were installed near the Bomber Mess and was ready to function the day the Mess was opened.

A bank of 5 stills (Cleaver-Brooks 3000 GPD) was to be installed at the Port Mess to supply that mess and assist the large bank when the working parties returned from the other islands to swell the Eniwetok population. It was later thought best to return these stills unused and depend upon the large bank, thus saving equipment, labor and time. A safety factor was had in the presence of a large water ship in the lagoon.

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A shallow well was bulldozed near the Port Mess and found to be free of noticeable salt content and suitable for showers and laundry. Approximately 30,000 gallons per day was taken from this well and after 4 months of dry weather it gradually increased in salt content. This work was done by advance party.

To save this well for laundry purposes another well was dug between the air strips and at first tested good enough to be used as potable water. Heavy drain on this well for showers caused it to gradually turn brackish. The first heavy rain made the water good again. The next heavy rain brought the salt content to 550 ppm. It is believed that this was due to using a large amount of sea water to settle dust on the air strip. The Port Mess well dropped to 120 ppm by 1 April 1948, after two heavy rains.

A permanent still bank of 6 Badger units of 3500 GPD capacity were installed near the Headquarters area for the permanent garrison. Storage for about 50,000 gallons is on the island.

The big problem of the atoll was the use of such a large number of small stills. This gave a personnel parts and maintenance problem of unbelievable proportions. A few large stills, diesel driven would have eliminated these problems.

Fuel was extremely poor, causing stalled engines and engines that would not come up to the speed required to operate the automatic clutches or drive the compressors.

The Cleaver-Brooks 3000 GPD proved the most complicated and gave the greatest maintenance problem.

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The diesel-operated unit is the only practicable unit for long operation. The Badger 3500 GPD was the best of the gasoline engine driven units.

2. Two men of the water team operated the 3500 GPD Badger on Engebi the entire time without trouble. They had a better supply of gasoline and were trained men. Well water supplied much of the laundry and showers supply.

3. Runit had five 1200 GPD Badger stills with one trained operator and 3 assistants. A member of the Engineer water team remained with them the first weeks.

A typical installation; the time necessary was as follows:

First Day: 6 men and the Mechanical Advisor, Mr. Hall arrived at 4 P.M. A tour of the island was made to find the best site for a water point. After mess, two stills were skidded $1\frac{1}{2}$ miles to water point.

Second Day: Clearing the area and starting the erection of the steel belted tanks (100 bbl) was started, one completed.

Third Day: Second tank completed and the uncrating of the units began. Sea-water feed lines were installed.

Fourth Day: Two stills were started, maintenance performed and the pipe line to the mess hall connected.

Fifth Day: All stills put in operation, instruction in operation and maintenance was given the new operators and minor repair and adjustments were completed.

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All days were from sunup to dark, average about 13 hours per day.

The installation at Aomon followed the same pattern. 95% of the trouble at both banks could be laid to poor fuel and fuel pumps. Stalling engines from fuel troubles greatly effected the morale of the operator and the total output of distilled water.

4. The Navy unit on Parry installed their own two 1200 GPD Badger units to which we later added a 3000 GPD Cleaver-Brooks, as the Badgers began to scale toward the end of the project.

5. In the last of January, a school was set up at the Port Mess. A salvaged 1200 GPD Badger, a new 3500 GPD Badger and the Meco diesel stills were used. The students were from the stateside to be used in weather stations in nearby areas. A colored team from the Port company took over later.

It is suggested that rain water collecting facilities be set up for the permanent garrison to eliminate the use of stills as much as possible.

Well water should also be used, and the use of the installed diamite filters will make the water safe to use for any purpose except vehicle radiators and boilers, where rain water should be used.

Trained operative personnel should always be available.

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CHAPTER XIII

RUNIT ISLAND

General Activities of Co "E" 532nd EB & SR

The first echelon of Company "E" landed on Runit Island on 29 December 1947. This group was part of the advance echelon which arrived on 24 December 1947 on the USS Yancey.

Runit Island of Eniwetok Atoll, Marshall Islands, is approximately two miles long and averages 500 feet in width. (See map of Eniwetok Atoll, Appendix 3). It is of typical coral formation with no point on the island over 10 feet in elevation with the exception of a shallow edge which was about 18 feet high that had to be removed to render it flat. Coconut trees were at one time cultivated on this island and at the time of arrival of the detachment from Company "E" these trees covered most of its area.

On 30 December 1947, Lt Cook with eight men of his Pioneer Platoon arrived to assist Lt Kelm.

Within the next two days practically the entire company had arrived making a total strength of four officers and 135 EM. Lt. Byron A. Brim, Commanding Company "E," was appointed Island Commander as an additional duty.

Found on the island on their arrival were several wartime structures, mostly Quonsets, built by the Navy. They were in varying stages of disrepair and decay but all of them could be repaired and put to use. However, additional structures would be necessary.

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Construction commenced immediately. Showers, latrines, a mess hall, quarters and other installations were put up in record time. A well was dug, reefers and an electrical system were set up. Later on, still banks for distillation of water were brought in.

However, all men were not used on housekeeping construction. On 3 January 1948, an improvised landing strip for light aircraft was completed. This strip, approximately 700 feet long, needed continual maintenance throughout the period of the operation. Twice a day the strip had to be wet down and took many man hours of labor until a sprinkling system was developed which did the job in a relatively short time. Light aircraft were thus able to bring in Army and AEC personnel very quickly this making it fairly easy for important project work on Runit (and other islands) to be inspected daily. Were it not for light air transportation, project work would have been delayed due to the lack of adequate water transportation and the length of time it would take to travel by water.

On 8 January 1948, a Medical Detachment consisting of one Medical Officer and three EM arrived on Runit. Capt Gerard Veenschoten, M.C., immediately set up a Field Dispensary in one of the buildings provided for his use.

According to plan, Company "E" was assigned approximately thirty-one projects to complete on both Runit and Aniyaanii Islands. All projects were completed on or before specified completion dates. Atomic Energy Commission personnel stationed on Runit were well pleased with the efficiency in which the men of Company "E" completed their assigned tasks.

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It is well to mention here that personnel working directly for the Atomic Energy Commission and JTF Engineers, both military and civilian, were stationed on Runit to supervise project work. Chief among these was Capt Joseph A. Waits, CE, resident Engineer. (Part II of the historical record of Runit Island has been written by Capt Waits) In his report, Capt Waits goes into detail on all construction work performed by civilians and all construction work performed by Company "E."

Aside from construction, the men of Company "E" had a wide assortment of jobs. Individually or in groups they were still bank operators, post exchange clerks, barbers stevedores, DUKW operators, etc.

Assignments on other islands were frequent. On 14 January 1948, Lt. J. M. Cook and Sgt Pease with three other EM proceeded to Engebi Island for the purpose of sorting reinforcing steel for concrete structures to be constructed on all islands. Other men of Company "E" never left Eniwetok except for short periods of time. The largest and most important of such groups was the General Repair and Carpenter Shop section consisting of Lt Morris Head and thirty-three enlisted men. This group operated directly under the Base S-3. Company "E" never totaled more than one hundred thirty-five men and five officers and according to the Company Commander, their average daily strength for the operation was approximately one hundred fifteen men and four officers.

Attesting to the efficiency of the organization as a whole and

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to the men forming that organization (Co. E) are a series of Commendations.

On 15 January 1948, Brig General Ogden arrived on Runit with an inspection team consisting of AEC Scientists, Army and Navy Officials. On this and subsequent inspections progress was noted and changes were recommended on the spot so that they could be incorporated in the job before it was completed.

Morale of the company was considered to be excellent as evidenced by the completion of all project work on or before the dates specified. Men worked up to twelve hours daily, including some Sundays. Post Exchange facilities were available to the men from 16 January 1948 to the completion of the project. Free movies were shown nightly. Cold beer and coke was available at a minimum cost. Meals were excellent and were highlighted by a daily serving of ice cream for dessert.

Runit Island was number three of three islands upon which major construction projects were planned for tests and experiments by the Atomic Energy Commission.

Actual construction was performed by Company "E," 532nd Engineer Boat and Shore Regiment less one platoon, in accordance with plans and specifications drawn up by the staff of the Joint Task Force Engineer and under direct supervision of a Resident Engineer of that staff. The project as originally planned included the items of construction as scheduled. In accomplishing its mission, Company "E" used two pioneer platoons consisting of two officers and 35 enlisted men for

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construction work, a heavy equipment platoon of one officer and 25 enlisted men and the following heavy equipment:

- 1 Compressor, air, trk mounted, 105 cu. ft.
- 1 Compressor, air, trk mounted, 310 cu. ft.
- 2 Grader, road mtzd. diesel
- 2 Scraper, road, towed 8 cu. yd.
- 1 Crane, revolving trk mounted
- 1 Shovel, crawler mounted
- 2 Crane, crawler mounted w/clamshell
- 1 Trailer, lowbed 20 ton
- 2 Trailer, 10 ton
- 3 Tractor, crawler w/bulldozer
- 6 Trk, cargo, 2½ ton 6 x 6
- 6 Trk, dump, w/winch, 2½ ton 6 x 6
- 1 Trk, prime mover 6 ton 6 x 6

Survey and layout was accomplished by a first order survey team from the United States Coast and Geodetic Survey under the supervision of Mr. Daniel Kennedy of the Army Map Service.

Erection of a 200 foot steel tower and a 75 foot photo tower, both located on the north end of the island was accomplished by contract with MK-PK Company, USA, under the supervision of Col L. C. Barnes, Western Oceans Division, Corps of Engineers. This contractor also erected the photo tower on Aniyaanii Island.

Panel forms for all concrete structures were prefabricated on Engebi Island and transshipped to Runit by a detail of five enlisted men. Reinforcing steel and hardware such as nails, bolts, tie wire

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and form ties were unloaded from ships at Engebi Island, sorted, and transshipped to Runit. Heavy equipment, cement and special concrete aggregates were unloaded directly off ships and stored in warehouses on the north end of Runit. All other construction material was unloaded and stored in an Engineer Dump at Eniwetok Island and was requisitioned by the Island Commander as needed.

Clearing of approximately fifty acres of coconut trees and moving of 50,000 cubic yards of earth was necessary before surveying, layout of structures, and construction work could begin. This clearing and grading was begun on 29 December when the first contingent of Company "E" came ashore with two bulldozers and began clearing an airstrip for light aircraft. The remainder of the company moved ashore on 5 January started rehabilitation of existing structures, established a water point, and set up a camp. Members of the MK-PK Company, who had completed the footings for the 200 foot tower while quartered aboard ship moved ashore with the company and began tower erection.

Surveying was begun on 20 January when Lt Commander Pfau and his survey party staked out the Hartman line, which also served as a part of the base line for the triangulation scheme. Due to high winds and bad weather there was a delay of about one week when no measurements could be made. This was overcome by using a canvas wind shield 3 feet high and 180 feet long, stretched along the windward side of the measuring tape and manned by 18 enlisted men. By using this system, the initial concrete building was located and layout completed on 29 January. All other layout was finished 2 February.

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Construction was initiated 21 January 1948 when excavation for the winch base was completed and concrete forms were set in place. Concrete for this structure was poured the following Saturday, 24 January, one week later, 31 January, base slab forms were set in place for the timing station. Since the base slabs for all structures were to be of a concrete, using local beach run coral aggregate, it was decided that all base slabs would be finished before any wall and roof forms were placed. Accordingly the base slabs for all structures were completed Saturday 7 February. Meanwhile wall and roof forms and reinforcing steel were being set in place at the timing station. All forms were completed by Friday 13 February and a monolithic pour of 83 cubic yards concrete was made using local beach run coral aggregate graded at approximately 65% passing a $\frac{1}{2}$ inch sieve and 35% passing from $2\frac{1}{2}$ to $\frac{1}{2}$ inch sieve. The mix was 1:2.5 by volume. The above specifications were followed as closely as possible for all other coral concrete.

Gamma Station C was next on the schedule of concrete pouring and was ready Saturday, 14 February. Particular attention was given to this structure as the concrete was of heavy scrap steel and limonite. No previous experience with this type of concrete had been encountered, and the problem of handling such heavy aggregate was plainly a job for heavy equipment. The aggregate consisting of nuts, bolts, and other scrap steel was proportioned out by weights and batched into 55 gallon steel drums modified so as to be readily picked up by crews and dumped into the mixer skip. Limonite and cement were added in the skip.

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Because of the heavy weight, $\frac{1}{4}$ cu. yd. was set as the maximum mix for any one batch. The use of this method proved very satisfactory and no difficulties occurred other than usual minor stoppages. The 8 cu. yds. of concrete in the walls and roof of this structure were poured in two and one-half hours.

The inside wall forms were stripped from the timing station on 18 February in order to allow representatives of Dr. Krause's AEC group to begin building a lead brick box, part of the technical installation. The concrete was in excellent condition and no temperature cracks were visible. Meanwhile forms and steel were being placed in position at the blast buildings, Gamma Station B, five type A and two type B blast footings. Permission was obtained to use slotted inserts, where bolts could be placed later, in all blast footings, and the seven that were ready were poured on 20 and 21 February using coral concrete. Gamma Station B was poured on 25 February. This structure, like Gamma Station C, is of heavy concrete; the same method of handling the heavy aggregate was used as described above and five hours was the time for pouring the 38 cu. yds. in the walls and roof. The walls and roof of the blast building were poured on 26 February without incident.

An old salvaged refrigerator was brought over from Eniwetok 27 February and placed near the Zero Tower generators for housing radar equipment. Power for operating the radar beacon is furnished by the Zero Tower generators which were placed in operation 28 February. Construction of a tank shelter approximately one mile from the Zero Tower was started 1 March and finished Friday 5 March. For this

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structure 6 and 8 inch salvaged iron pipe, 18 to 20 feet long, was used to form a retaining wall. Gamma Station A was the final concrete structure of heavy concrete and was poured 3 March. Meanwhile a member of Dr. Shonka's AEC group was preparing the slots of Gamma Stations B & C for the final concrete pour necessary to imbed the instruments. This pour was made on 5 March.

Thursday, 4 March, a crew of 12 men from Dr. Krouse's group arrived and began laying the main coax cable between the Timing Station and the Zero Tower. The ditch for this cable was opened to a depth of 24 inches with a motor grader. Directly behind the coax cable crew a Navy cable laying crew laid and spliced the R G 18/U and 10 conductor cables, which also connect the Zero Tower and the timing station. The ditch was backfilled at a later date after all cables had been tested.

The installation of inside utility power wiring and power generators for the timing station was completed 3 March and Dr. Grier's MIT group of 6 men moved in March 4th to install air-conditioning and technical equipment. This work was finished Saturday, 13 March. Two members of this group remained behind in order to service and maintain the equipment. In order to have the inside electrical wiring of all structures finished before the main body of scientists arrived, this work was given first priority and rushed to completion by 13 March except for the wiring inside the Zero Tower cab which was done by two electricians of the AEC group from Los Alamos.

In accordance with Par 2 e, Change Order No. 2, beach sand was hauled and spread along a strip 100 feet wide, extending from the

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400 foot station to Gamma Station C. Nine thousand (9000) cu. yds. of sand were hauled in this operation which began on 8 March and extended over a period of 14 days. After the sand was in place, it was decided that an area of 100,000 sq. ft. around Gamma Stations A & B should be stabilized, using the soil cement method in an attempt to control the dust that would rise after the blast.

Outside power distribution wires were placed around the timing station, Gamma Station B and blast building, Monday, 8 March, under the direction of Dr. Clark and Mr. Hedberg of AEC. This proved to be a very simple task as care was taken to label each wire as it was placed. All other outside wiring and floodlight installations were finished during the week ending 13 March.

Most of the week ending 20 March was spent removing excess supplies from three 40 ft x 100 ft Quonset huts on the North end of the island near the Zero Tower, and in general police and clean up around all structures. Also during this week a 38 ft square concrete slab 4 inches thick was poured underneath the Zero Tower. This was the last concrete to be poured for any AEC structure and all work up to this time was one week ahead of schedule. However, there still remained four concrete bases to be poured for seismograph instruments; two located on this island and two to be precast for Parry Island. This work was finished during the next week and Mr. Cloud of the U.S. Coast and Geodetic Survey who arrived 24 March began installation of the seismograph equipment. The seismograph installations were completed on 31 March.

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A detail of one Officer and 10 EM of Company "E" moved in on Aniyaanii Island Tuesday, 23 March and in one week completed the erection of a generator shed, seismograph shed, servicing and installing two 15 KW generators and the laying of 25,000 sq. ft. of pierced plank to complete the Light Aircraft landing strip which had been previously cleared and graded.

The week ending 3 April was spent doing final clean-up work and with most of the working crews assisting members of the various AEC groups. With the exception of a few minor details and the soil stabilization, the entire project for Runit Island was 100% completed 3 April.

From 29 December 1947 to 3 April 1948, approximately 14,230 man hours and exactly 90 working days were used up by Company "E" 532nd Engineer Boat and Shore Regiment in completing its mission on Runit Island.

Many small problems arose as the work progressed but were solved without causing serious delay or interruption of the work schedule. Of great assistance in this respect was the mobile heavy maintenance shop, established on this island at an earlier date. Shortages, such as form tie bolts, and other machine jobs, were quickly substituted by the machine shop.

Heavy equipment was very much in demand throughout the construction period and at times there seemed to be a shortage of mobile cranes. This type of equipment is an assist to concrete pouring as well as many other construction problems.

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Inter-island transportation was accomplished mostly by LCM boats supplemented by DUKW whenever possible. There was an acute shortage of the LCMs which at times caused delays in the construction program.

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CHAPTER XIV

AOMAN - BIIJIRI - ROJOA ISLANDS

General: Chronological highlights from Unit Diary

The initiation of construction on these islands was delayed until 22 December 1947, on which date the Navy completed the evacuation of some one-hundred and forty-two (142) native inhabitants. It was possible, however, to complete enough of the initial survey work prior to 22 December to enable tower erection crews to begin construction on that date and to complete all foundation work in time to receive steel erection crews early in January 1948.

The forward echelon of Company "D", 532d Engineer Boat & Shore Regiment, the unit assigned the construction mission on these islands, arrived at Eniwetok on 24 December 1947 aboard the USS Yancey. The "Yancey" was the cargo ship loaded with construction equipment and supplies for the construction units of the 2d ESB. The personnel included equipment and vehicle operators, supply and the advance groups for setting up the initial housekeeping.

On 29 December 1947, Lt. Midlam arrived on Aoman Island with the first Army construction group to begin preliminary clearing and grading for the company's construction camp. This advance detachment was quartered aboard the LST 45 anchored offshore which was used as a floating hotel where the civilian tower crews were also billeted.

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The second increment of Company "D" consisting mostly of 2d Pioneer Platoon arrived on 1 January 1948 and began construction of camp and housekeeping installations. This group joined the first aboard the LST 45 for quarters which was not nearing capacity for comfort.

The clearing of coconut trees on Aoman was rapidly progressing and on 1 January 1948, grading on the airstrip running approximately east and west across the island was begun. This necessitated the removal of 12 to 16 inches of powdery black topsoil which became a nuisance due to the large amount of dust. The subsoil was fairly stable but not satisfactory until soaked with water. To further stabilize the strip a layer of crushed coral helped considerably.

On 2 January 1948, the balance of Company D were preparing most of the organizational equipment on Eniwetok for shipment to Aoman and commenced shuttling the earth moving vehicles and supplies in preparation for a full swing operation in a matter of days. As more equipment and supplies were shuttled, the population on LST 45 grew with the complaints about being crowded, however this inconvenience encouraged the men to work all the harder to complete their camp on shore. On 9 January the company headquarters and the remainder of the main body of D Company moved to Aoman and the camp was officially established. The men living aboard the LST 45 also moved ashore but left with some regret for many strong friendships were born between men of the services. General Ogden arrived this day to inspect the newly opened camp and enjoyed the noon meal, when he expressed compli-

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ments on the airstrip which was completed on 7 January 1948 and on the quality of the food prepared in the field.

Aoman, Biijiri and Rojoa Islands are separated by water of various depths which presented a problem of continuous transportation and the lack of ready boat transportation. This problem was solved by the use of DUKW's of the 461st Transportation Amphibious Truck Company.

On 1 January 1948, five (5) EM of the 461st Transportation Amphibious Truck Company were attached to Company "D" for duty. They operated and maintained three (3) DUKW's that were later augmented by the arrival of four (4) additional DUKW's and eight (8) operators, the maintenance of these vehicles was ably performed by Technician Third Grade Eugene H. Sanderson.

The 461st Transportation Amphibious Truck Detachment played an important and vital part in the successful accomplishment of Company "D"'s mission on these islands.

Company "D", 532d EB & SR on 12 January was in full swing on the construction project and continuously improving their camp to provide comfort and rest which was well earned by all. The first shipment of PX supplies arrived this day with cold beer and Coca-Cola on sale as the main items. A makeshift rig was used to show the first movie on 13 January while a permanent projection booth was being constructed. This became the prime source of entertainment and even though some of the shows were not new releases, they were enjoyed.

To hasten the initial phase of the construction which was more time consuming than a difficulty, two shifts of equipment operators

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were organized on 13 January to expedite the clearing and grading of the island. The company had just reason to be proud of its heavy equipment operators and mechanics, very few of whom were initially experienced at their work.

During the first four (4) days on Aoman, there existed only the limited means of communications of drop and pick-up messages by the ISCOM Light Aviation Section and those carried by small boat or DUKW. On 5 January 1948, the radio telephone system not yet established, radio operators from 532d EB & SR Signal Section were dispatched to Aoman Island to establish and maintain the inter-island communication system that would improve a more effective control. This radio net proved of great value and was instrumental to maintaining overall control of distribution of equipment and men, and simultaneous progress on all islands.

The first church service on Aoman 16 January 1948, conducted by Chaplain Shea in the evening. Due to the scattered location of the islands, normal Sunday Church services were held during the week, on Aoman, usually scheduled on a Friday permitting the one chaplain to visit at least one day at each camp. Sunday was proclaimed the official holiday observed by most on the Atoll, however, troops on duty in the continuous functions and the special jobs that could not be interrupted were compensated with a day-off during the week. Swimming and fishing were the most popular forms of recreation, the latter performed with first class tackle and spears furnished by the Special Service Officer.

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Communications service became ideal when the radio-telephone signal center was established on Biijiri during 19-22 January and the use of the radio telephone net put into full operation. The 532d EB & SR closed their radio operations, heretofore the only electrical means of communications operated by Technician Third Grade Claude Bledsoe and Technician Fourth Grade Thomas P. Martinez. These operators were highly commended for their faithful and specialized work.

The USS Sgt Sylvester Antolak and the USS Marshal Victory were anchored off Aoman for the period 19-26 January. AEC supplies, equipment and instruments were shuttled ashore by LCM LCVP and DUKW's. This started a beach dump that grew rapidly and was ably managed by Lt. Paul W. McGowan and Technical Sergeant Vaughn M. Cole with a group of 8-10 EM throughout the assignment. Company "D" received a letter of commendation from Major Osver Gibson, ISCOM Port Director with an indorsement from the Commanding General CTG 7.2 for the expeditious and the cooperative manner in which the "Antolak" was unloaded.

The AMBIRO (Aoman, Biijiri, Rojoc) Command was established at this time with Major Jesse D. Kelsay covering this group of islands, leaving the Commanding Officer, Company "D" free to direct his activities solely to construction, while Major Kelsay directed and coordinated functions on these islands.

Company "D" Order #1, dated 20 January 1948, promoted eight (8) EM to Privates First Class and left the company with no privates

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on its roster. On this date Staff Sergeant James S. Byrd returned to duty from 147th General Hospital in Honolulu, where he was treated for a skin rash. He was assigned the duty of Fire Warden and Provost Sergeant a task which he performed with adeptness and dispatch. Through his efforts the camp sanitation greatly improved and more organization was noted in the performance of the utilities section.

The first accident of any concern happened on 21 January 1948, when Technician Fifth Grade Hymel broke his arm while cranking a bulldozer. Some weeks later Technician Fifth Grade Scott suffered a severe laceration of the right hand while butchering meat. These two cases were evacuated by light planes which were now considered most essential. Worthy of mention is the fact that other than an occasional accident requiring first aid, the health of this command was superior. The few cases of fungus infection, believed caused largely by the ever-present dust, and still fewer cases of ringworm, also caused from dust, required only minor care. Notable was the small percentage of ringworm cases which may be attributed to the fact that wearing of shorts on the job was prohibited, and matters of dress pertaining to wearing trousers inside boots.

The inter-island ferry, inaugurated on 23 January 1948, and operated by the Navy, made two runs each day, stopping at all islands proved to be very expeditious in transporting men and small items of supply. The service was interrupted for two days when a storm with high winds and lashing rains broke on 22 January. Minor damage was

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was done to the camp by the high winds that night which did not interfere with the progress of the mission.

Fingerprinting that had commenced on the USS Pickaway in connection with security measures was finally completed on 24 January, with the arrival of the CIC. Security posters were conspicuously posted and observance, talk, discussions or inquiries about the structures were conspicuous by their absence. Everyone was properly indoctrinated in the importance of his work and their attitude was exactly what was expected. Mr. Adams, Special Agent CIC, arrived on 15 January with five (5) Military Police to take over the security program and operate the beach traffic control point. The number of MP's increased until a platoon of thirty six (36) men were on duty on these islands late in February, under the command of Lt. Ashford and Lt. Nelson second in command. CIC personnel were rotated frequently, with agents Lochatur, Williams, Dustra and Bartlett performing tours of duty.

A defence order of the atoll was published on 26 January and a local plan in conformity with the overall defence was adopted. Weapons were procured from Eniwetok and Technician Fifth Grade Charles E. Heavenridge constructed and operated the armory containing M-1 rifles, carbines and 30 caliber machine guns.

During the last week of January the working groups began making strides, progressing with speed and efficiency. The absence of the thirty one (31) enlisted men rehabilitating Eniwetok was felt and a request for the return of as many of their men as could be spared for

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construction, was granted. Sixteen (16) enlisted men were returned which helped relieve the hardship of short crews.

On 31 January, Dr. Clark arrived and spent the succeeding two days in locating the positions of the structures on Biijiri Island. Work commenced on the construction of the blast structure and winch base the following day.

The 2nd February saw the personnel of the unit reorganized into construction teams designed to function on a production line basis. Staff Sergeant John K. Bimfort of Regimental Headquarters Company, assisted by Technician Fourth Grade Richard V. Bengel of the same unit spearheaded the construction work, surveying the various sites, establishing locations, grade stakes, etc. Lt. Carriere and Master Sergeant Harold A. Burton with eight (8) to ten (10) carpenters were assigned the task of erecting concrete forms.

The removal of these forms was extremely difficult and several recommendations were submitted to improve them. Most notable among these was the use of metal forms that could be left in place. This group of carpenters, for the most part unskilled, performed their duties in a professional manner.

The concrete crew under the direction of Lt. John F. Heath and Technical Sergeant Wilmer E. Rigdon consisted of eighteen (18) to twenty (20) men and left little to be desired from any source. They were constantly under surveillance throughout their work by both military and civilian officials and personally commended by Dr.

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Carlson, the concrete expert on the AEC staff.

The stevedore and supply crew under Lt. Paul W. McGowan and Technical Sergeant Vaughn M. Cole proved to be the workhorse of the assignment and their dump areas were in a continuous state of turn-over due to the accelerated rate of materials going through them. This crew performed in lieu of a Quickway or M-20 crane on more than one occasion.

The steel crew organized under Lt. Gregory L. Brickhouse and Sergeants Alferd E. Wood and Thomas D. Thigpen encountered perhaps more problems than any other, due largely to delay in procurement of materials and arrival of materials not properly classified. Several jobs were held up due to missing items, namely bolts and plates. The erection of the guide curbs along the causeway gave this crew a real opportunity to show their worth and their day and night work on the project proved they were good for it.

The setting of the various cubes and shapes for the Bureau of Yards and Docks was ably handled by Staff Sergeant George T. Burgess. His digging in, grouting and grading was a source of much concern and interest for many weeks by Lt. Commander Erickson, USN.

A ten hour workday was put into effect commencing 2 February along with the operation of the construction teams. This left the troops little time on their own during daylight hours. Certain phases of the jobs required the teams to work late into the night making it questionable whether production equalled their effort.

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The first concrete in the form of a winch base was poured on 2 February and the location of cubes on the various radii on Aoman was started the same date.

February 3rd saw the completion of the 200 foot tower by the MK-PK Company and the arrival of the US Coast and Geodetic Survey team. In the evening, General Ogden addressed all personnel at the theater with a brief resume of the units history. The Commanding General also expressed his expectations of the unit on their job assignment. Dr. Clark spoke also, on the history and working of atomic power.

The MK-PK men started work on the cable anchor at the foot of the tower on 3 February. The site for Gamma Station "A" was surveyed on that date and the clearing job on all three islands was completed the same day.

General Hull inspected the area again on 4 February and commented on the notable progress in clearing and grading, construction and camp development. An I & E program was inaugurated at ISCOM Headquarters and Staff Sergeant Andrew Steiber was appointed I & E NCO in addition to his duties as Operations Sergeant.

Erection of the form for Gamma Station "A" was commenced on 5 February.

The tank revetment on Biijiri, constructed of heavy 12 x 12 timbers coconut logs, pierced planking and local fill was completed on 6 February the construction having taken six days.

On 8 February the winch for Neutron Cable "A" was set on its

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base, concluding construction work on that site. Work was started on that date on the Timing Station and the generator shack adjacent to it.

Gamma Station "B" and "C" were started on 9 February with the sites surveyed, excavations commenced and the batter boards erected. The Photo Tower was completed this date.

Blast footing "B" was surveyed on 10 February and construction commenced on it the following day. The 10th also saw the cable anchor poured and the 11th the slab and paving under the 200 foot tower were poured. The survey party completed their work and departed, also on the 11th.

1st Sergeant Carl C. Gustafson, of Regimental Headquarters Company, took over the construction of the Blast Footings, ably assisted by Technician Fourth Grade Warren F. McCleskey and Onofre Montoya of this unit. This crew started work on Blast Footing "A" on 12 February. Erection of the fifty (50) foot poles also commenced this date. They were completed on the 17th.

On 18 February all blast footings on Aoman were completed and the following days work started on eight of the footings on Biijiri. The generator shack on Biijiri was completed this date.

Staff Sergeant Leonard T. Barry conducted experiments in soil stabilization during the period 16 to 20 February, employing the use of a soil cement mixture. Experiments were also performed by sowing plots of ground with oats and grass. It was the soil cement combination however that was later to play a big part in stabilizing the

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approaches to the Gamma Stations.

The Timing Station on Biijiri was poured on 28 February in one continuous mold, the concrete crew completing the work far ahead of the estimated time schedule. The use of cranes and pouring buckets contributed in no small measure to the rapid work.

On the 25th February the Bureau of Yards and Docks timber structures were started on Biijiri and completed five days later. The lead crew arrived on the 25th also, prepared to install the coffin in the timing station.

An M.P. guard post was established at Zero Tower on 26 February to safeguard the various items of equipment and supply located there, also to maintain a watch on the generators and lighting system that had been installed to illuminate the tower.

The base for Gamma Station "A" was poured on 28 February and by the use of an .05 percent mixture of "sugar" by weight to cement content, the concrete was transported to Rojoa by DUKW and the base of Gamma "C" poured in that manner.

The first phase of the lead coffin installation in the Timing Station was completed on 6 March after being started on the 1st.

On 5 March, work was begun on the 400 foot Station Shed, the 1000 foot Station and the Quonset Hut on Rojoa. Blast footings "B" were finished on that date.

The Massachusetts Institute of Technology team arrived on 5 March and commenced wiring the timing station and installing the air conditioning units.

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The forms on Gamma "A" were stripped on 6th and 8th March, revealing probably the best concrete finish of the entire project. It was at this time that a fifteen (15) KW generator was added to the power plant at the Timing Station which called for an alteration of the shed to house it.

The 10th of March saw the arrival of the co-axial cable group and they started work immediately. Their line having been previously established, a ditch was laid open that they might start laying their cable. The causeway constructed by the Hawaiian Dredging Company was completed on the 11th and with the fill job carried out by members of this unit, regular traffic across it became heavy. This offered a problem when the time came to lay the cable across the causeway, but delays in re-routing traffic lasted only a day or two. The forms for Gamma "C" were removed in the meantime. The Company Supply section under Lt. Clarence S. Warman and Staff Sergeant William Jones completed on the 11th a survey of all form 32's and submitted a requisition for newly authorized clothing and equipment on arrival at home station. All work on the Generator Shack and Timing Station was completed on 11 March.

All type "A" blast footings on Biijiri were completed on 12 March. The Company's veteran grader operator was also lost on the 12th March when Technician Fourth Grade Charlie H. Bowman departed for the U.S. on a 30 day emergency leave and eventual transfer to Hq 2d ESB.

The wiring and utilities work on the Timing Station was completed

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on 17 March and the forms for Gamma Station "B" removed, thus completing the construction phase of that job.

All surplus property and equipment was loaded out on the "Yancey" on the 15th of March for shipment to the U.S. The coaxial cable in the meantime had been laid across the causeway and as far as the 400 foot station.

The period 19th to 22nd March was used to enlarge the tent area to accommodate an anticipated influx of officers and civilian workers.

The bulk of the working crews were knocked-off from 20th to 24th March to concentrate on the development and construction of a recreation center for U.S. Navy personnel on one of the small islands north of Aoman.

The steel crew continued to work on a split shift basis, installing two curbs along the causeway. There, as before, during the erection of reinforcing steel, the need was felt for the TO & E welding generator that had been left at the home station. The curb job was finally completed on 21 March.

On 23 March, a crew led by Dr. Hartman commenced work on the blast structures. The same day an ARC Water Safety and Instruction course was inaugurated at Eniwetok with Private First Class Donald F. Hutcheson and Martin F. Sasanoff attending.

An additional job to the original assignment presented itself on 24 March when it became evident that the approaches to the Gamma

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Stations would have to be backfilled, graded and stabilized with the soil-cement mixture that had proven itself during previous experiments. All available personnel were assigned to this job and a weeks time saw it completed.

An emergency alert plan was published locally by the CIC and MP's on 24 March and all personnel briefed in its functions.

New water distilling units were installed at this time greatly alleviating the stringent condition the entire command had undergone in water conservation during the previous months.

The I & E Lectures given by Col. Karlstad, "Something about the Atom" and Major Brose, "Atomic Energy and National Defence" during the month of March did much to enlighten all concerned on what the assignment was about and where it fitted into the world today.

On 30 March an entry list was submitted to CIC in accordance with pertinent directives, authorizing listed personnel only to travel between the islands.

Camp was broken on 6 April and Company Headquarters with all personnel departed Aoman for Eniwetok. All attached men were returned to their units and the company welcomed back those of its members who had been attached to other organizations.

Part II Note: Technical data from the Engineer's report has been omitted since it duplicates that contained in the report of the Task Force Engineer.

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CHAPTER XV

ENGEBI ISLAND

The construction on Engebi Island commenced with the arrival of the survey party, the foundation crew of the MK-PK Company and fourteen (14) Enlisted Men from the 18th Engineer Construction Company. Work was immediately started on the excavation for the Zero tower footings and clearing and initial grading for the main control line between the Zero tower and the timing station sites.

Until 24 December, all construction personnel, civilian and military, lived aboard the LST 45 or the LST 219 which were alternately anchored offshore to serve as "floating hotels". Pending the arrival of the remainder of the 18th Engineers from Eniwetok, the Resident Engineer, JTF 7 directed the activities of the advance party from this unit. When the entire Company arrived at Engebi, Captain Herbert Batz, Company Commander, was in direct charge of construction operations.

From the start of construction, and practically up to its completion, one of the major activities, from a standpoint of man-hours required, was the off-loading of small boats which brought material and equipment to the island. This was necessitated by the fact that numerous large coral heads on the lagoon side and the reef on the ocean side prevented beaching or docking of larger vessels.

By 16 December, the Zero tower footings were completed, survey and layout for the remainder of the structure was well advanced and a

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sufficient quantity of cement, lumber, reinforcing steel and other items of construction material had been delivered to the island to permit the maintenance of construction continuity. By this date also, three 3000 GPD distillation units were put into operation to provide water for cooking and drinking purposes; as the average demand was approximately 4500 GPD, it was never necessary to operate more than two of these units, with the remainder for standby use.

On 24 December, the remainder of the 18th Engineers arrived from Eniwetok and on Christmas Day dinner was served in the mess hall and was proclaimed an overwhelming success by all the participants. On this day, an inspection of the main generator bank would have revealed four (4) 50 KW diesel units performing satisfactorily and providing an ample supply of current to the entire island; the drinking water was sufficient, it tasted good and it was medically acceptable; quarters, set up in existing buildings, were airy and clean with sufficient space per individual for personal comfort; a motor repair shop was in operation; a dispensary manned by a medical officer and enlisted corpsman was ready to render first aid and allied treatment, other cases to be evacuated to Eniwetok. Other communal facilities provided during the month of December included church services which were conducted by an Army chaplain who came up from Eniwetok each Sunday afternoon for this purpose; motion pictures were shown every night, using 35mm film provided in the atoll circuit; a small post exchange which averaged \$4500 per month and an enlisted men's day room were located in the same building; mail was handled by

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both air and water transportation to and from Eniwetok, where the central APO was located.

Transportation facilities between this island and the other islands in the atoll were considered quite satisfactory. Until the airfield on Engebi was closed to large craft on 24 February because of the necessity of blocking a portion of the strip with new construction, C-47's operated two flights a day to and from Eniwetok. These flights were supplemented with L-4's and L-5's which continued this service until the technical operation started. Schedule water transportation was furnished by LCI's which made two round trips a day between Eniwetok and Engebi, stopping at Runit and Aomon en route. In addition, other craft (LCM, LCT, LCVP and DUKW) hauling material and equipment between the islands afforded means of personnel transportation.

In addition to intra-island telephone service, radio telephone service was established between Engebi and the rest of the atoll. Coupled with one teletype circuit to Eniwetok, this provided a most satisfactory communications system which was in operation twenty four hours a day.

Approximately 2400 gallons of mogas and 1100 gallons of diesel fuel were required for one week's operation of distillation equipment, diesel plants, etc. Storage for two weeks supply of all types of fuel was provided on the island. This supply was replenished at regular intervals by means of an LCM fuel boat from Eniwetok.

The 18th Engineer Construction Company consisted of one hundred and eighty one (181) officers and Enlisted Men, one hundred and thirty

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five (135) of whom were effectively engaged in construction. Except for the fact that an additional six carpenters would have facilitated holding construction schedules and, perhaps, would have resulted in bettering the completion dates by a few days, the personnel contained in the Company were well distributed as to occupational specialties. Good leadership by the Officers of this Company, together with the superior attention to duty of a really excellent group of Non-commissioned officers in many ways offset the fact that this Company lacked somewhat in experience in this particular type of construction. With regard to the latter, the Joint Task Force Engineer and his staff provided assistance in planning and supervising the actual construction.

Because of the scattered locations of buildings, blast footings, slabs and aprons to be built of concrete, it is believed that material saving in time would have resulted from the use of transit-mix concrete trucks, hauling from a central batch plant; however, this particular type of equipment was not available on the atoll. Other than this, the construction equipment was well selected as to number, type and condition.

Generally all items of construction were completed on or before the dates set forth in a completion schedule which had been prepared by the JTF Engineer and accepted by the AEC prior to the start of construction. The MK-PK Company started actual steel erection of the Zero tower on 2 January and topped out nine days later. The

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test erection of one of these towers in the vicinity of Albuquerque, New Mexico, paid in dividends in the time saved in the final site erection because of the supervision experience gained and the fact that the contractor was able to properly match mark the various structural members.

The construction work by the soldiers also progressed without delay. The island was divided into two sectors; one platoon assigned the responsibility of construction within on particular sector. One of the most time-consuming activities was the paving and oiling of the area around the Zero tower, even though an appreciable amount of paving was eliminated by virtue of the fact that the hard compacted airstrip surface falling within the area to be paved was oiled only. This change, recommended by the JTF Engineer, was approved by the Test Director and the Scientific Director on their visit to Engebi on 15 February.

It was necessary to set-up rock crushing facilities on the island in order to obtain properly graded aggregate. A good borrow pit location was selected and material was crushed and screened, for use in the concrete at Engebi and the other islands. Concrete beams and cylinders were made, the former tested in a field testing laboratory which was set up by the OCE representative at Engebi, and the latter shipped by air to the Honolulu District Engineer for correlation with field test beams. A tabulation of laboratory test was maintained by the JTF Engineer and it was found that strengths attained greatly

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exceeded those anticipated. Dr. Roy Carlson, of the AEC staff, was available to assist in supervising all concrete operations, including the special mix used in instrument stations "A" and "B". His assistance was invaluable.

A central carpenter shop was located on Engebi for the purpose of prefabricating all building forms for all islands. This carpenter shop was manned by personnel from the 18th Engineers, Company D, 532d EB & SR and Company E, 532d EB & SR. Where construction schedules permitted, forms stripped from buildings at Engebi were sent to the other islands for re-use.

The Protective Construction Division, OCE, the Bureau of Yards and Docks, the Bureau of Ships and the Bureau of Medicine, USN, with permission of the AEC, designed and requested the construction and/or placing of certain structures or prefabricated containers. Each of these organizations furnished the required materials and the following of their representatives assisted in the supervision of the construction of the items in which they were interested:

Office of Chief of Engineers	Maj. J. M. DeBardleben Mr. R. C. Linthicum
Bureau of Yards and Docks	Lt. Cmdr. J. A. Erickson
Bureau of Ships	Lt. Vicars
Bureau of Medicine & Surgery	Capt. Harold Draeger (USN)

On 14 March, 1948, with the work substantially completed (98.5%), two (2) officers and forty eight (48) enlisted men of the 18th Engineers departed Engebi.

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On 6 April 1948, the remainder of all construction and maintenance personnel were removed from Engebi and the construction phase was considered complete.

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CHAPTER XVI

MOBILE BOAT POOL #1

Although not a part of TG 7.2, the U. S. Navy, Mobile Boat Pool #1 is included in this history due to the manner in which its activities closely intermeshed with those of this organization, which includes activities of the Boat Detachment, 532d EB & SR attached to the Navy for boat operations.

A system for requesting small boats for lighterage and inter-island shipment was adopted, and used successfully based on experience gained during the last war in the SW Pacific. All boat requirements for shore based units were requested through ISCOM S-3, who after evaluation delegated priorities, consolidated these requirements into a message which was then sent to the Commander, Mobile Boat Pool #1 aboard the LSD 19 (USS Comstock). During the first month of operation, boat requirements sent by message were satisfactory, but when the need for boats increased, and peculiar cargo loads with involved supply runs came into the picture, new problems arose. A request for a Navy Liaison Officer to attend a conference each day, was made to the Commander, Mobile Boat Pool. This officer would discuss the boat requirements with the S-3 representative and assist in delegating priorities. The advantage were readily seen and the Navy cooperated by sending ashore the requested officer, which was the solution to the difficulties. This plan improved with suggestions from each service until the burden was negligible, for at the end of each day's

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conference the boat requirements for the following day were

definitely firm that the assigned boats would beach on time in the proper order. It also permitted the Navy to brief the crews on any anticipated peculiarities and suggested methods in overcoming any delays. Sending the daily boat requirements by message was still maintained for record purposes.

In line with the policy decided on by JTF 7, that all water craft would be under control of TG 7.3, the Boat Detachment, 2d Engineer Special Brigade with their LCMs and LCVPs were attached to the U. S. Navy, Mobile Boat Pool #1, upon arrival in this area. Lt. Harry F. Prock, Boat Officer and his detachment were attached for duty with the Navy on SO 3, Hqs. ISCOM, APO 187, dated 7 January 1948, although they functioned with the Mobile Boat Pool from the time of their arrival on 24 December. The Brigade Boat Detachment was based aboard the LSD 19.

Upon arrival on the 2d ESB Boat Detachment aboard the USS Yancey, they were assigned the mission of unloading that ship. After partial unloading at Eniwetok, they accompanied the Yancey to Engebi Island. At Engebi the experienced boat crews, by working long and steady hours, completed the unloading of the Yancey in the record time of eight days. In recognition of the superior work performed, Lt. Prock and his boat crews were officially commended by Captain C. T. Caulfield, Master of the USS Yancey.

The USS Warrick was the next vessel worked by the 2d ESB boats, but this operation took considerably longer due to the varied cargo

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and the peculiar stowage. However, the boat crews put in long tire-some hours, often missing the regular meals, until the task was completed.

Following the unloading of the Warrick, the Boat Detachment returned to their Operational Headquarters aboard the LSD 19 where they were dispatched to work other supply ships and on inter-island transshipment runs. In addition, special jobs were assigned, one of which was the lagoon tower project.

The LCVPs stationed in the Eniwetok vicinity were utilized mostly for taxi service, transporting personnel and light cargo from ship to shore, shore to shore and ship to ship. Light vehicles and limited mobile loaded cargo moved from Eniwetok to any of the islands as far north as Aomon Island was considered within their scope of operation. The crews aboard these smaller boats also put in long hours, not only during the normal duty time, but standing night watches on boats moored in the lagoon.

Part of the Navy Mobile Boat Pool stationed on LST 219 anchored off Runit and LST 45 anchored off Aomon, included some of the 2d ESBs boats which served the Engebi, Aomon, Runit vicinity. These boats were normally used for local runs within this zone.

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CHAPTER 17

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CHAPTER 18

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CHAPTER 19
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CHAPTER 20

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CHAPTER XXIII

ENIWETOK FUEL TANK FARM

- Enclosures: (A) Eniwetok fuel tank farm (existing)
(B) Eniwetok fuel tank farm (proposed)

Originally, the Eniwetok tank farm was one system and used for Avgas storage except for tank 1-D and 2-D which were in Mogas service. The tanks are of light weight advance base type - bolted flange with rubber jacket seals. All lines are of light weight spiral welded construction with victaulic couplings.

At the outset of the Sandstone Operation, the tanks were inspected for leaks. Since there was from 1 to 3 feet of fuel in each tank, it was assumed that there were no leaks in the bottoms of the tanks. Time would not permit a hydrostatic test on the tanks and lines. The outsides of tanks 1-D and 2-D, 1,2,3,4,5,6,7 and 8 (enclosure "A") did not show signs of severe rusting. However, tanks 9, 10, 11 and 12 were severely rusted; particularly the tops and around the seams.

This fuel farm was originally filled through a submarine pipe line which extended approximately 150 yards off the beach. At the beginning of this operation, the submarine line was non-existent. Therefore, all gasoline was brought ashore through the use of an LCM rigged to transport bulk fuel.

Several lines ruptured during the initial stages of pumping 70 to 80 psi. The lines that were leaking were uncovered and found

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to be rusted through. Sections were either repaired or blanked off. After repairs had been made, no leaks were observed except at the flange joining the top to the side of the tanks. It was necessary to use tanks 9-11 for Avgas storage so a temporary line was run from the tanks to the beach. Tanks 1-8 were used for Mogas and tanks 1-D and 2-D for diesel oil.

Near the end of the operation, tank 1-D developed a leak at the bottom. It was impractical to repair since the tank was resting on sand and any effort to dig under it would cause the tank to move. To compensate for the loss of 1-D, tanks 4 and 5 were put into diesel oil service.

Because of the conditions mentioned in the preceding paragraphs, the following recommendations are submitted:

- (a) If a pier is built long enough to moor an A.O.G., lines should be installed as shown in Encl. (B). If this pier is not constructed, submarine lines should be installed to serve the purpose.
- (b) All lines should be renewed with standard weight 6" screw or flange pipe. Six inch pipe is recommended because the low head pressure will not supply sufficient fuel to keep a 250 GPM pump primed.
- (c) As the tanks are emptied, they should be dismantled. A concrete foundation should be poured and new tank erected.
- (d) Pumping stations should be installed in accordance with Encl (B).

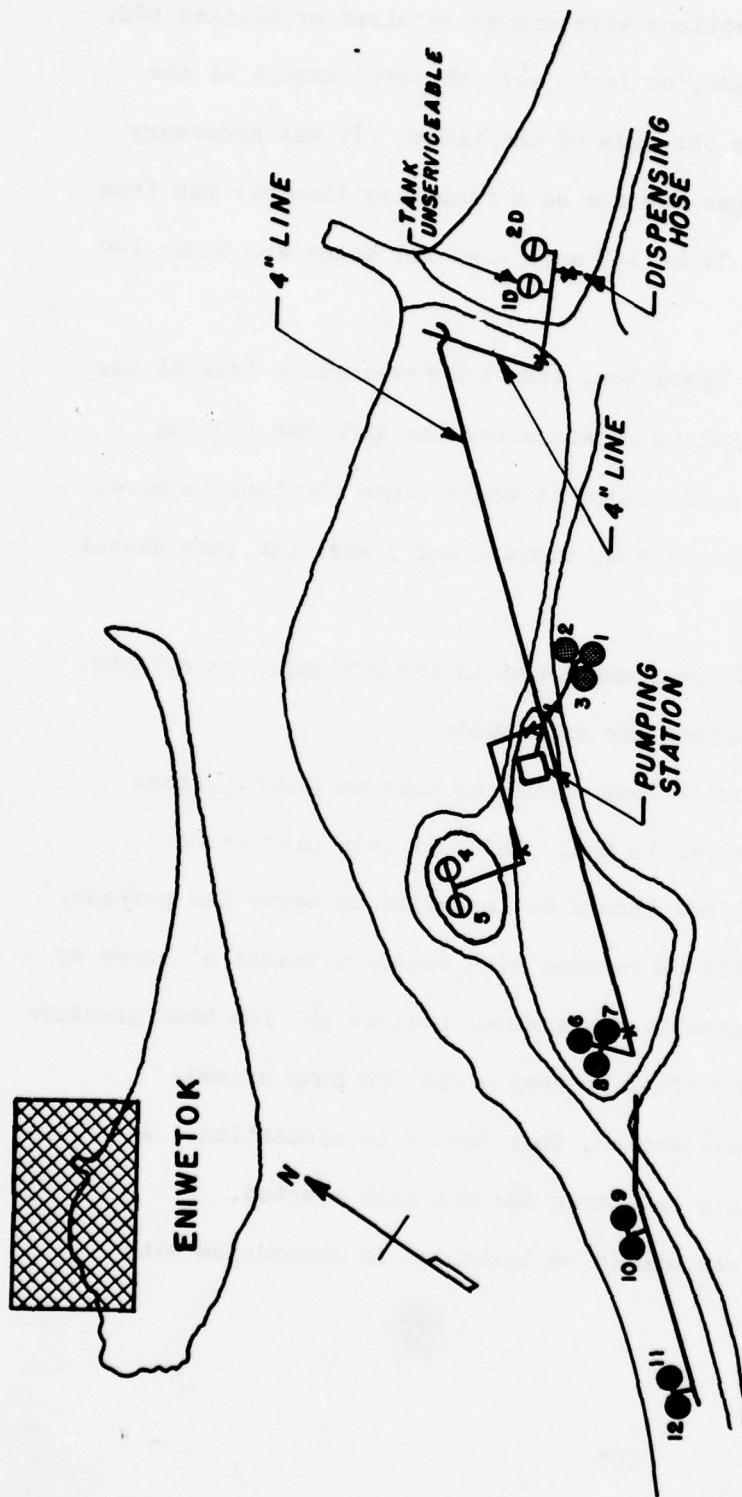
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DIESEL — ⊖ 20, 4, 5
 MOGAS — ● 1, 2, 3, 6, 7, 8
 AVGAS — ● 9, 10, 11, 12
 All tanks 1,000 bbls. each.

ENIWETOK TANK FARM (EXISTING)

DATE: 16 MAY 1948

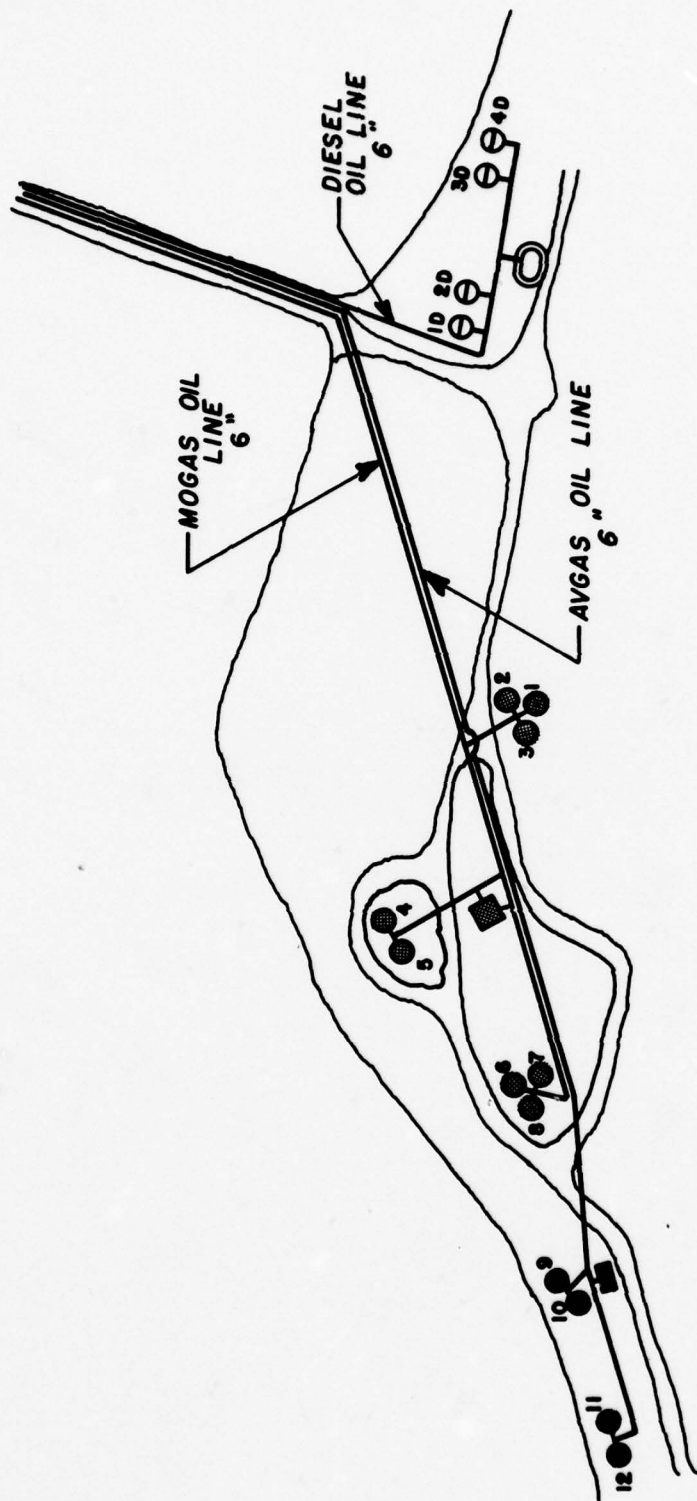
SCALE: 1" = 300'

ENCLOSURE A

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ENIWETOK TANK FARM (PROPOSED)

DATE: 16 MAY 1948

SCALE: 1" = 300'

ENCLOSURE B.

LEGEND

PUMPING STATION	TANKS*
○	— DIESEL — 10, 20, 30, 40.
●	— MOGAS — 1, 2, 3, 4, 5, 6, 7, 8.
■	— AVGAS — 9, 10, 11, 12.

*All tanks 1,000 bbls each.

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CHAPTER I

ACTIVITIES FROM "P" DAY THROUGH "Z" DAY PLUS TWO

Events leading up to and during "P" Day.

Preparations for "PX" Day became a realight on 5 April 1948, PX minus 3 days, with the submission of rosters of personnel to be embarked for evacuation during the practice exercise for X Day. CTG 7.2 was responsible for the normal embarkation of all personnel on Eniwetok and Parry, and for emergency evacuation of standby personnel remaining on those islands during tests. CTG 7.2 was responsible for removing only personnel of his own Task Group on the other islands in Eniwetok Atoll during test periods, except for the Zero Island being tested where responsibility for removal of all personnel rested with CTG 7.1.

Prior to this time, instructions governing all phases of the exercise had been issued by CTG 7.2. A "Military Check List" based on JTF 7 Field Order No. 1, Annex G, as well as a "Plan for Emergency Evacuation" had been circulated. A practice emergency evacuation staged on 3 April 1948, wherein personnel assembled at the LST Dock, permitted principles for orderly seeking of shelter and emergency evacuation to be evolved.

On 5 April 1948 a practice "White Alert" was held to insure that no unauthorized personnel were on Eniwetok and Parry Islands, the procedure for executing the White Alert is shown in Operation Order #1, Headquarters, Island Command, dated 24 March 1948. A thorough search of all buildings on the two islands was made at this time and positive identification of all personnel effected, subsequent to which Headquarters, JTF 7, gave permission to cease the state of alert.

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On "P-2" Day, 6 April, all personnel except generator watches, signal equipment operators, security details and key scientists were evacuated from the three zero islands to Eniwetok, and all personnel were removed from the two Zero Islands not to be tested the following (minus one) day. Except for some minor work and cleanup, construction on Engebi and Aoman was considered complete at this time, and little Army Task Group construction remained to be done on Runit.

On "P-1" Day, the evacuation groups were embarked from Eniwetok as per the plan issued by CTG 7.2. The normal evacuation for Parry Island had taken place on minus two days. Standby personnel on Eniwetok and Parry, including key utility personnel, security forces, special equipment operators, drone control, light aviation and RadSafe personnel all remained ashore to carry out their missions. "Embarkation Plans" for all test days proved to be virtually the same, and only one of them is attached to this report.

Units were checked aboard their respective ships by representatives of the Iscom 3-3 and were accounted for again by muster after arriving aboard ship, and necessary reports made to Hq, JTF 7.

One important task of TG 7.2 was to water down the coral runway on Eniwetok so that the vision of ground control crews of the Drone Planes would not be obscured by dust raised during the drone takeoffs. An average of about 10,000 gallons of sea water was used for wetting down the strip for each test operation.

The practice "P" Day of 8 April was a success and later in the morning the ships re-entered the lagoon and commenced discharging their passengers about noon.

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CHAPTER II

ACTIVITIES BEFORE AND AFTER TESTS ON ZERO ISLANDS

SHOT "X"

A. The critical period from X-4 to X-1 at X island was one of some tension but was overcome without difficulty. The scientific group leaders wanted to retain as much as possible of their supplies and equipment on the island until the last moment to guard against possible needs, whereas TG 7.2 had the problem of evacuating the bulk of these items by X-3 because of the manpower, boats and equipment shortage that would exist at a later time; the matter was amicably and successfully worked out. Each of the two groups required engineer manpower and equipment assistance during the last two days prior to the shot to make their final technical installations and tests.

TG 7.2 also provided messing and billeting facilities for AEC personnel until noon on X-1 day, the same as had been done on PX-1.

CG 7.2 assigned a field grade officer, the AMBIRO (Aoman-Bijiri-Rjoa Islands) Commander from the 432d EB & SR, to take command of the island and discharge his responsibilities until -1 day. This proved to be a good move for the purpose of expediting the movements and use of men, equipment and boats.

Many of the needs during the last two days were taken care of through the adroit employment of DUKW's. Some of their uses were as a prime mover, mobile cranes, floating cranes, air compressor and as a truck; four DUKW's were on the Zero island to be tested until X-1. No real difficulty was encountered in handling of the evacuation, though as a result of the "X" experiences it was decided in the case

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of the Yoke and Zebra tests to leave a dozer and mobile crane on the Zero island to be tested until 1300, X-1. As was to be expected in preparing for the first shot the valuable experience obtained was taken advantage of in successive shots. The scientists also made the most of the capabilities of the engineer assistance available to them, and the knowledge of the scientists' needs gleaned by the construction engineers during the first test greatly facilitated preparations for the following tests.

SHOT "Y"

B. Through several "on the spot" conferences with the scientific group leaders, firm plans were made and carried out covering the Y-4 to Y-1 periods. At Y island this phase became remarkable by its smoothness and orderliness. By Y-2 all but five engineer troops had been evacuated from the island. Also all equipment and supplies from the various task groups were evacuated except that which could be hand carried off the island, or which could be moved in the limited AEC transportation left until Y-1. All this was possible because of the cooperation between the scientists and 7.2 troops and the experiences of the first shot. A few auto service mechanics and a small air compressor for the purpose of minor motor adjustments and inflating tires were left on Y Island until -1 day.

The plan followed was to move all non-essentials from the island to the extent that by Y-2 only that which could be evacuated in 3 LCM's and 1 LCT was left. This number of boats was known to be available a week prior to evacuation time in the case of Y test. There was sufficient equipment for all needs on the islands until the last moment.

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The confidence and orderliness on the part of the scientists was very notable during the preparation period for the Y shot. It might be added that an adequate supply of cold beer, good food and hot coffee promoted the furtherance of morale of all workers.

SHOT "Z"

The general plan followed for Z-4 to Z-1 was essentially the same used for the period Y-4 to Y-1. However, due to the last minute additions to some of the installations the DUKW's were again kept on Z Island beyond their planned departure, but without resulting difficulty.

Again the preparations were carried out in an orderly systematic manner. This can be attributed to the decision to move the AMBIRO Island Commander to successive islands, effecting a continuation of the ready understanding of the scientists needs by the island commander. An additional requirement provided at each island was an officer possessing a thorough knowledge of beach operations, as well as characteristics of equipment, to be present on the beach during loading and discharge of equipment. In the absence of a qualified embarkation officer, delays and damages to equipment would invariably occur.

GENERAL COMMENTS

The final preparations by the scientific groups required certain work by the engineers that could not be done at an earlier date. This work is listed for general information:

1. Timer station and co-axial cable group (Dr Krause)
 - a. Cover 4000 foot of co-axial cable ditch.
 - b. Backfill and stabilize with soil cement three sides of

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the timing station.

2. Air Blast Group (Dr Hartman)

a. Bury two ponton cubes and protect with cocoanut logs and 1 inch of earth.

b. Dig ditches for approximately 1000 feet of wire; backfill.

3. Neutron cable group (Dr Linnenberger)

a. Erect 6 earth mounds for cable samples.

b. Furnish DUKW for laying marine neutron cable.

4. Gamma Station Group (Dr Shenka)

a. Stabilize earth in front of each Gamma station.

b. Furnish lumber and supplies as needed at each building.

5. Radio controlled Tank Group (Dr Bowman)

a. Prepare area in vicinity of tower for retrieving samples.

6. Bomb installation group (Dr. Henderson)

a. Furnish crane and operators.

b. Prepare road from beach to tower.

c. Remove winches and generators at tower after bomb is raised and placed in firing position.

II. Post Test Demolitions and Salvage Operations.

A. AT X, Y, Z ISLANDS

About 5 days after each test certain work was ordered to prevent possible counter-intelligence surveys of bomb blast effects.

This work consisted of:

1. Total distribution of 6 OCE structures (only at X island).
2. Movement of 84 Navy Bureau of Yards and Docks test cubes.
3. Removal of 12 blast footings from test locations.

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4. Movement or destruction of all large structures that had been moved or damaged by blast.

5. Recovery of stalled radio controlled tank from crater (Only at X Island).

6. Preserving special concrete structures by filling metal tubes with a rust preventative and applying asphalt coating, inside and out, followed by sand palliative.

7. Disposal of contaminated, 5 generators, 2 air conditioning units, 2 search lights by dumping in deep water of lagoon.

8. Recovering for further use 1 generator from blast building and neutron cable winch.

The above work was accomplished with 6 men, 1 DUKW, 1 crane and 1 dozer in one or two days' time under directions of the one field officer who had commanded the island previously tested.

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VIP OBSERVERS

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for the observers. DUKW's were also used to take Yoke and Zebra Day observers on tours of the site of X-ray and Yoke tests.

Featured on the day of arrival of the guests at Eniwetok were talks on the construction and test features of the tests, with accompanying relief maps and charts to include a schematic, perspective drawing of the typical test features on a Zero Island, given by the Army Task Group Commander, General D. A. D. Ogden, and the Task Group 7.1 representative, Dr. J. C. Clark. Interest evinced in these talks was made evident by the number of questions asked and by the close examination of the Test Island perspective.

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ROLL - UP

CHAPTER I

GENERAL

Planning for the roll-up of Operation Sandstone began early in February with the discussion of the permanent garrison that would remain on Eniwetok, after completion of the present tests. The contemplated use of Eniwetok for future Atomic tests, the preparations for the permanent garrison, and close-out of facilities relative to Operation Sandstone were prime considerations in planning the roll-up. Early planning made possible the proper location of new installations and improvement of existing facilities, which would be beneficial, not only to the permanent garrison, but also available for any future operations.

Included in the plans for future tests was the rehabilitation and securing of existing warehouses and barracks that appeared serviceable for at least two to five years, and the razing of buildings that were already unserviceable or constituted a fire hazard. Roll-up of Operation Sandstone would leave Eniwetok in a good state of police, ready for the next operation.

Organization Commanders had been warned that there would likely remain a short period of time after Z Day to complete the roll-up before embarking their own units. As a result of careful planning and the cooperation extended by all, the roll-up of Operation Sandstone progressed satisfactorily and without any noticeable hardship, despite

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the fact that additional work burdens were imposed, to include post test work on the Zero Islands and conversion of twelve family quarters.

CTG 7.2 responsibility included rendering all necessary assistance to TG 7.1 in its roll-up activities. This particular function is broken down into three separate phases: namely; clean-up after the tests, salvaging and storing of usable equipment and outloading which includes the preparation for embarkation.

In the clean-up a small forde from the original construction unit would reenter the test area after the blast to perform the necessary work of destroying, relocating or preserving the structures and installations. Radiological safety monitors accompanied these groups to insure their safety from undue radioactive contamination.

Items of value on the Zero Islands proclaimed safe by the Rad-Safe representative were collected and shipped to Eniwetok where they were placed in the AEC warehouses, except for the items salvaged after the first and second tests that were moved and installed on the subsequent test sites for further use. Breaking camp and moving their equipment to Eniwetok before the test days kept all available personnel occupied. Once the units from the Zero islands arrived and were settled on Eniwetok, they committed all available manpower to bolster the labor pool engaged in roll-up activities.

The outloading at present progressed rapidly and smoothly as outlined in FO #2, JTF Seven. No unanticipated bottlenecks were met and the peak of the roll-up activities began on or about 17 May 1948.

Details on the activities of the roll-up are incorporated in a following chapter covering Eniwetok where most of the work took place.

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Additional information concerning these activities are also found in the third phase of the Operational Report of TG 7.2 (P,X,Y & Z Days) that are repetitious in some instances due to the fact that the activities during the test periods intermesh with those of the roll-up, for the purpose of facilitating the latter. The following chapter deals with the establishment of a permanent garrison for Eniwetok, materializing on completion of the roll-up.

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CHAPTER II
POST SANDSTONE GARRISON

The first conference to discuss the permanent garrison issue was held by CTG 7.2 on 31 January 1948. The advisability of developing Eniwetok Atoll as a permanent atomic energy proving ground was discussed with the intention of submitting to JTF Seven Headquarters a tentative plan for maintaining a garrison force to include a substantial working force to prepare test structures. Though the matter of having a construction force was not deemed practicable at this time, the essential requirements of a permanent garrison, and a conception of the size of any interim construction force were evolved. On 10 February 1948 a memorandum prepared for the Commanding General, Joint Task Force Seven, contained recommendations on specific tasks to be performed on Eniwetok Atoll in connection with facilities for the permanent garrison and preparation for further tests. The reference memorandum set forth the recommended composition for the permanent garrison and a proposed list of its equipment and supplies and gave a phasing out plan of cargo and personnel to be shipped from Eniwetok at the conclusion of Sandstone Operation. The information presented in the memorandum was incorporated in FO #2, Headquarters JTF Seven, dated 8 March 1948 as the logistics for the allocation of shipping found in Annex "E" of the same FO.

In still another communication to Commanding General, USARPAC, Oahu, T. H., a recommended T/O & E and the T/A for Post Sandstone garrison was presented by CTG 7.2 for approval 24 April 1948

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Permanent construction for an Atomic Energy Proving Ground at Eniwetok Atoll is described in a Communication to JTF 7.

A list of materials and equipment required needed from Oahu or the U. S. for conversion of twelve family quarters submitted by CTG 7.2 was approved by General Hull 20 April 1948, subject to approval of CINCPAC, and tentative radio requisitions to Oahu with information copy to JTF Seven Rear in Washington, D. C., was submitted by items.

Availability of all items and shipping space were established by 10 May 1948 when CINCPAC gave clearance for allowing dependents to come to Eniwetok. Conversion of twelve family units was initiated immediately and notification to ship all short items given to Oahu and the U.S.

The permanent Garrison Commander, Major Norman M. Quist arrived on 16 May 1948 and the T/O & E was carefully reviewed and certain modifications effected to suit the adoption of equipment found most serviceable for the needs of the garrison.

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CHAPTER III

ACTIVITIES ON ENIWETOK AND PARRY ISLANDS

Roll-up activities, in respect to actual loading out, began just prior to X Day. Two units completed last minute construction on Aoman-Biijiri and Runit, D and E Companies 532d EB & SR, but this involved only a third of the units in each case. Then too, there was post test eradication or preservation of structures to be performed on each Zero Island. Otherwise the various units were contributing heavily to the labor pool that furnished the necessary details to complete rehabilitation and construction for the permanent garrison.

The base carpenter shop had received orders for making approximately 1000 boxes and crates, completed more than 700 prior to Z Day. The experience gained by the carpenters throughout this operation made their task fairly simple, and the boxes and crates became available well in advance of their requirement. Discounting the materials used by the units in their own packing and crating, construction of the above mentioned boxes consumed 48,000 board feet of lumber.

P, X, Y and Z Day activities had not seriously interfered with the preliminary roll-up operations. Lessons learned on P Day were put into effect; personnel was assigned to roll-up work when not required for activities connected with the tests.

The roll-up task reached its peak on Z plus one Day, when all but a slight demand on work personnel for post test operations ceased, and practically all effort could be put into the completion of rehabilita-

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tion and outloading on Eniwetok and Parry Islands. The only exceptions to this were the construction of two light plane runways on Runit and Biijiri Islands, briefly described in the following chapter, and the dependents housing, described in a final chapter. Parry Island was completely rolled up and evacuated, except for the shore based Navy seaplane detachment on 19 May 1948.

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CHAPTER IV

CONSTRUCTION OF PERMANENT RUNWAYS ON BIIJIRI AND RUNIT ISLANDS

Just prior to Z Day construction of two pierced plank runways for light planes was commenced on Biijiri and Runit Islands. This would give the garrison force, with its two liaison planes, frequent and speedy access to the islands used in connection with the tests. These islands are: Engebi, Aoman-Biijiri Rojua, Aniyaanii, Parry and Eniwetok. The previously constructed soil cement and earth strips on Biijiri and Runit respectively were found to be in poor condition after the blasts; also the Runit strip heretofore used was considered to be too close to the Zero tower. The previously constructed pierced plank runway on Aniyaani and the two coral strips on Engebi and Eniwetok remained in excellent shape and gave promise to last from two to five years without serious deterioration. On 19 May the new pierced plank strip on Runit was completed and put in operation while initiation of the strip at Biijiri still awaited Rad-safe clearance, at the time of the departure of the main forces 28 May 1948 on the PICKAWAY, having been contaminated by the Runit blast. Runit Island itself had been declared free of contamination by the Rad-Safe representatives on Z plus 2 days. Pierced planking for the two strips had just arrived from Oahu aboard the USS Yancey and half of it unloaded and shipped directly to Runit Island.

The pierced plank strip at Runit was constructed by Lieut Kelm and thirty (30) men from Co E, 532d Engineer Boat & Shore Regiment; on the morning of 17 May with a bulldozer, mobile crane and a motorized

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road grader were shipped to Runit. Their first tasks were to unload 110 tons of pierced planking and to shape and grade the base for the runway. By dint of hard labor and resourcefulness the 1000 foot long runway, fifty (50) feet wide, with two graded runover end zones each 100 feet long, was completed by 1700 hours, 19 May or in about twenty (20) working hours. The first plane landed on this strip at 1630 19 May 1948 and the pilot declared it a perfect strip; by contrast the previous Runit airstrip had elements of hazard due to shorter length and a generally uneven surface. Cleanup was effected on the morning of 20 May and the working party and equipment returned to Eniwetok to resume other roll-up activities.

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CHAPTER V

DEPENDENTS HOUSING ON ENIWETOK

Installation of partitions, roofing repair, screening and other carpenter work is proceeded apace on the conversion of the twelve family dwellings and, together with the interior painting, was completed 25 May 1948. The electrical wiring, to include the heavy duty service lines needed for the electric water heaters and kitchen ranges, commenced on the receipt of wiring and switch boxes 20 May 1948 and was completed before departure of the last of the Sandstone forces. The plumbing, a rather considerable installation, started on 20 May 1948 with the arrival from Kwajalein of some of the materials and equipment required. Installation of lavatories and showers or renovation of the existing ones, was finished on 27 May 1948. The roughing in eleven toilets, with the accompanying drains and Navy cube septic tanks, is a considerable task carried on after the departure of the Pickaway by fifteen plumbers of the Army Task Group, and is expected to be completed before they leave Eniwetok by air 16 June 1948.

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CONCLUSIONS

1. When first notified on 9 October 1947 of my assignment to Operation Sandstone, the 2d Engineer Special Brigade which I commanded, at greatly reduced strength, was widely dispersed at schools and various detached missions. The most urgently needed task was to reassemble the unit and build up the three companies which were to take part in the operation by transfer of all available men from the companies remaining behind. This complex task kept both me and my entire staff fully occupied up to the time of embarkation and prevented my making a personal reconnaissance of the site, although the opportunity was offered. Such a reconnaissance should be made by a Task Group commander, although the excellent report of the Joint Task Force staff officers who did make such a reconnaissance largely made up for the lack of it.

2. The unit from the 2d Engineer Special Brigade was successfully assembled and prepared for overseas movement, arriving at Eniwetok Atoll on 23 and 28 December 1947. I arrived by air 20 December.

3. The advanced detachment, consisting of the 1220th Provisional Engineer Battalion, under command of Major Hussey, had arrived on 29 November from Hawaii and had established mess and other administrative facilities. They had also unloaded preliminary shipments of construction supplies and equipment. Preliminary work was well under way.

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4. Eniwetok Atoll is one of the most westerly of the Marshall Islands. It lies in latitude $11^{\circ}30'$ North and longitude $162^{\circ}20'$ East. It is 360 statute miles northwest of Kwajalein, a way station on the trans-Pacific air route. The annual rainfall is 52 inches. The climate is moderate, with temperatures varying between 67° and 97° Fahrenheit. The atoll is 25 miles in diameter and consists of 47 separate islands, the largest of which is $2\frac{1}{2}$ miles long and 1,500 feet wide, with a minimum altitude about 10 feet above sea level. This largest island, Eniwetok, was the site of an important bomber base during the late war and all available space on it was occupied by the facilities needed in connection with it. Parry Island, adjoining it, to the northeast, separated by $2\frac{1}{2}$ miles of drying reef, is somewhat smaller. It had been the site of a seaplane and naval supply base and was largely occupied by the Quonset structures which comprised it. Twenty-two miles to the north is the island of Engebi, which is 4,500 feet in its maximum dimension and contains a 3,900-foot fither strip. It, too, was occupied by badly-rusted Quonset structures.

5. During the month of January and part of February, strong winds, seldom dropping below 25 kn, and frequently reaching 50 kn, blew from east northeast. Salt spray rising from the breaking surf on the outer reefs pervaded everything, causing heavy rust on all metal surfaces. This condition apparently occurs frequently, as

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there is evidence of a high rate of deterioration of all metal structures and mechanical equipment. In the month of February, the wind dropped to normal trade wind characteristics, velocity 10 to 12 km, direction 70° magnetic. No further high winds were encountered. The rainfall was very light and did not interfere in any way with construction.

6. The plan of operation was to prepare three islands, Engebi, Acomon, and Runit, for tests. Eniwetok was to be the supply and administrative base, Parry was to be the control center and contain several scientific installations. Another small island, Aniyaanii, was to have a photographic tower erected upon it. Troops were to move from island to island to meet operation and construction requirements. Engebi was conditioned to have a housing capacity of 350, Acomon to have 300, Runit 250, and Parry 100, but these maximum capacities were only used for brief periods. Eniwetok had a maximum population of 1,650 men, but the total troops ashore on all islands never exceeded 2,000.

7. In view of the rapid and frequent shifting of troops from one island of the lagoon to another, a good signal communications net and a system of inter-island transportation were first necessities. The first necessity was met by use of tactical radio sets, SCR 399, in the hands of the troops. This equipment was later replaced by VHF radio telephone service, which functioned in a superior fashion.

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8. For inter-island transportation of equipment and supplies, a daily scheduled LCT and LCM service was established and operated by the Naval Task Group. Frequent scheduled LCI service carried personnel, light cargo, and mail, with stops at every occupied island. Individual transportation was furnished by liaison aircraft operated by the Air Task Group, for which landing strips were built on Acomon, Runit, Aniyannii, and Parry Islands. This latter service repaid many times the labor and effort spent in establishing it and contributed greatly to the speed of operations. In the 60-day period of greatest activity, 13 liaison airplanes (L-5's and L-4's) carried more than 5,000 passengers. In a single peak day this squadron carried 175 passengers and 3,000 lbs. of freight. DUKW's supplemented landing craft for inter-island short haul work.

9. Since construction plans were well completed before embarkation from the mainland, construction materials were packed and marked for the island upon which they were destined to be used, and unloaded at the site. Only the general unallocated stocks and surpluses were unloaded in the general depot at Eniwetok. This saved much inter-island transportation, but necessitated a careful system of record keeping to keep track of location of the various items.

10. Once the framework of transportation and signal communications were set up, construction work proceeded with great speed.

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Major items of construction were finished by 20 March. Construction work executed thereafter consisted solely of closing out items which could not be done until after scientific equipment was installed.

11. In general, the time schedule was as follows:

November - December ----- Mobilization

January 1 to March 15 --- Construction of test structures

March 15 to April 15 ---- Installation of test equipment

April 15 to May 15 ----- Tests

May 15 to June 1 ----- Embarkation

June -----Return to stations

These time allotments were about right and even if the force had been larger the work could not have been done much more rapidly.

12. The ships containing the scientific task group arrived on 16 March, and thereafter operations proceeded on schedule, as covered in other reports and annexes to this report. The last ship is expected to sail 4 June 1948.

13. My comments and recommendations are as follows:

a. Some early confusion occurred because the initial force had an inadequate staff. Staff work was piling up on my arrival 20 December. It was not adequately handled until the arrival of the 2d Engineer Special Brigade Staff about 1 January. It should be remembered that staff work is heaviest a few days after landing and sufficient staff personnel to handle it should accompany the advanced force.

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b. The advanced force was also weak in supply personnel. Depots must be opened and operated as soon as cargo begins to move ashore. Supply accountability must commence at once. It is easier to start supply accountability right in the beginning, than to go back later and correct past omissions. This was particularly obvious in the post exchange stock account.

c. In an operation of this character, incoming cargoes contain many special instruments and much delicate apparatus. It is of utmost importance that ships' cargoes be carefully handled and unerringly accounted for. A port director must be present with the arrival of the first ship and must so organize his port that every packing case or crate is accurately accounted for, because the loss of any one of them might prejudice the success of the entire operation. A port identification number (SANDRA) is placed upon every item of cargo by ports of embarkation in the United States for the purpose of establishing cargo accountability. It was successfully used on this operation, for no important item of cargo was lost. In order to tie this system of cargo accountability into the general supply system, a Transportation Corps officer with the duty of maintaining port cargo accountability records must be on the staff of the Island Commander. At the outset, we had only a port director, but later were assigned a chief of transportation on the island staff. The improvement in cargo control was so great

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immediately following this appointment that it was obvious that it should have been made in the beginning.

d. Organized Military Police are needed at once to guarantee property security and for protection of delicate and fragile equipment. They are also needed to maintain discipline.

e. Standards of discipline were high. There were no men confined in the guardhouse throughout the operation. There were but few court-martials and these were for petty offenses, which were punished by small fines. This condition is attributed to hard work, good, and excellent recreational facilities.

f. The subsistence furnished under the navy ration was rated the best they had ever received by both officers and enlisted men. Good preparation and service was insured by a food supervisor furnished by USARPAC. A good food supervisor, supervising and coordinating all messes in a command of this character will benefit the command greatly.

g. The recreational equipment furnished was well selected and adequate. Nightly motion picture shows were furnished and were an important factor in good discipline and moral. The Eniwetok Radio Station, operated by USAFI, was much appreciated. It would have been even better had it been opened sooner. There was a large enrollment in the extension courses of USAFI. The most popular sports were softball, handball, volley ball, swimming, fishing, and

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tennis. Rapid changes in manpower made more highly organized sports like boxing and track impracticable.

h. There should be Chaplain services available at all times for both Protestants and Catholics.

i. LVT's were taken out with the advanced force and used to a limited extent. It is not believed that this equipment would be worthwhile in another similar operation, because of maintenance difficulties. The work which this equipment will do can be done just as well by DUKW.

j. The Army Task Group was deficient in administrative and housekeeping personnel. In an organization of this character, there are many technicians, both civilian and military, to whom administrative service must be rendered. The force should include a service organization of approximately 200 men, whose duties shall include those of:

Cooks

Kitchen police

Table waiters

Orderlies

Chauffeurs

Baggage handlers

Grounds police

Colored soldiers can be used for this purpose. Highly trained technicians should not be used.

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k. Planning for an operation should commence at least six months before field operations. If this is done, money and manpower will be saved.

l. An adequate field laundry should be provided. The present type field laundry does only rough dry work. The quality of its work was unsatisfactory and had a damaging effect on morale. A complete laundry should include water treatment facilities, and pressing and starching facilities for cotton clothing.

m. Any used equipment shipped to an overseas destination such as this should be thoroughly tested and inspected by a responsible person, who will sign an inspection certificate to be attached, before it is crated for shipment. In the event unserviceable equipment is shipped, responsibility can then be placed. Many items of used machinery were shipped to this project without such inspection and without spare parts. At the time of shipment many such items required major repair work. Unless spare parts are available for shipment with or ahead of the basic machine, used machinery should not be shipped. Machinery in need of repair should never be shipped.

n. Liaison planes were very useful time-savers. Such planes must fly off 1000-ft air strips. Since distances are short, speed is not an important qualification.

o. Since swimming was an important and very popular form of recreation, it is recommended that the following articles of equipment be included in future operations:

Durable underwater masks.

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Swim fins.

Fishing spears.

These items should also be carried in the post exchange.

p. The Army does not furnish a satisfactory type of headgear for tropical service. The nearest thing to it is the cold-wet weather cap. When used it should be furnished without ear-flaps. Because of its name, it is not generally considered an article for tropical wear. Its appearance should be improved. Criticisms of authorized tropical headgear are:

- (1) The sun helmet will not stay on in the wind.
- (2) The fatigue cap is unsightly and furnishes no shade to the eyes.
- (3) The overseas cap furnishes no shade to the eyes and exposes the wearer to dangerous sunburn.

A satisfactory cap would fit closely to the head and stay on in strong winds.

- (1) It should be light, washable, and nonshrinking.
- (2) It should have a vizor about 2 inches long to shade the eyes in bright sunlight.
- (3) It should be natty in appearance.

q. At Eniwetok, great use is made of electric power.

For this operation, power was provided with portable field generators. Because of the large number of separate installations, maintenance and operating costs were high. Because ordinary generating plants

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do not contain voltage regulators or synchronizing arrangements, separate generators for signal installations were required. Better power could be delivered more cheaply from a central generating plant of at least 2000 KVA, distributed through underground transmission lines.

r. Accountable supply officers, including all army services, Air Force, Navy, and civilian agencies, should be on duty at an early date. Property accounts should be opened at the time the operation commences.

s. Ice cream is an essential article of diet in tropical service. It should be served at least daily in every mess, and can be served twice daily without surfeit. The ice cream machines furnished were not durable and no spare parts were furnished with them. It is recommended that an ice cream making machine of durable type be approved for issue and that it be supported by adequate maintenance parts.

t. Household-type refrigerators are a valuable addition to living comfort. They should be plentifully provided.

u. Household-type washing machines furnish the best laundry service for troops in field camps. Three per company of 200 men is the correct number for use. Spare parts should accompany them.

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v. Where troops are fed in large central mess halls, china, glassware, and tableware must be provided. This fact is frequently overlooked.

w. Public address systems are useful in construction camp areas, and increase the administrative efficiency of any company.

x. The service shoe proved more desirable than the combat boot.

y. Ships' manifests must be forwarded for infallible delivery before a ship's arrival. For initial shipments, this is of the utmost importance. Upon many occasions on this operation, they were not received on time.

z. The only insect pests on Eniwetok are flies and ants. The flies are particularly obnoxious. DDT will keep them down but not eliminate them. Breeding places must be sprayed with a ground trailer-type spray at frequent intervals. In addition, an airplane-type spray should be used at 15-day intervals.

aa. Shipments of post exchange stores were regularly and heavily pilfered. All varieties of articles were stolen, but especially beer. Port directors must be cautioned to place military police on all trucks carrying post exchange stores. Individual trucks must move under a special dispatch system at both the port of embarkation and the port of debarkation.

ab. Many units reported for duty at Eniwetok without motor transportation, expecting it to be furnished upon arrival.

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In spite of the fact that a large amount of motor transportation was available for issue, the quantity was insufficient. In future planning, units should be directed to take their own motor transportation, or it should be provided for issue upon arrival.

ac. Cement should be carefully packed for overseas shipment. The packing of cement shipped from NABD Port Hueneme, California, was superior. There was no loss in transit. Other cement, packed in loose paper sacks, suffered a 20% loss.

ad. All pipe and pipe fittings should be of the heavy galvanized type. Rust conditions on Eniwetok rapidly destroy any other type. There should be a general stock of small sizes of galvanized pipe and fittings for construction of outlet connections.

ae. Because of the great distance from a depository, and parent disbursing officer, the finance officer at Eniwetok should be an accountable disbursing officer. The transaction of official finance business will then be more expeditious.

af. The M-20 crane with D-8 tractor was a most useful piece of equipment. It is the only equipment which will lift and transport weights in excess of 10 tons. In an operation of this character, it is in habitual use.

ag. The D-7 and D-8 bulldozers equipped with double drum power control units were also most useful. One or two D-8's equipped with the Hyster winch would have been useful. The beach dozer was not taken and was not missed.

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ah. The equipment should have included the following

pumps:

4 550 gpm @ 300-ft head

10 155 gpm @ 50-ft head

25 50 gpm @ 50-ft head

ai. Roller conveyors were most useful and should be liberally provided. They should arrive with the earliest equipment.

aj. Almost all equipment employed used wire rope. Consumption of this item was heavy. Replacement stocks should not be overlooked.

ak. Engineer Supply must stock large quantities of electrical supplies and equipment. Switches and similar equipment should be of marine type, because of constant exposure to rust and corrosion.

al. General building material stocks should include liberal quantities of 3/4-inch plywood, wall board, long lengths of 2" x 4", 1" and 2" dimension lumber, building hardware, and cement.

am. If buildings are to be again rehabilitated for occupancy, ample quantities of light colored paint, both inside and outside, with spray guns, should be included in early stocks of building material. Light colors are preferred to dark because of their cooling effect. Rehabilitated buildings should be painted before occupancy. This contributes greatly to morale and cleanliness.

an. The DUKW is an extremely important piece of equipment at this site. The 16 furnished here were the correct number. They operate most efficiently in the hands of a regular TC DUKW unit, for thus they receive the special maintenance and parts service they require.

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14. Reports covering all phases of Operation Sandstone have been submitted separately in four phases. An outline of the topics covered in each of the four reports is inclosed.

D.A.D. OGDEN
Brigadier General
U. S. Army

Section VIe

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HEADQUARTERS
ARMY TASK GROUP
APO 958

1 June 1948

OPERATIONAL REPORT
TG 7.2 Activities Up To Embarkation

PART I - 532d ENGINEER BOAT & SHORE REGIMENT

- Chapter 1 General Ogden Called To Washington, D.C.
- Chapter 2 Action Upon General Ogden's Return to Fort Worden.
Selection of Special Staff.
- Chapter 3 Reorganization of 532d Engineer Boat & Shore Regiment
- Chapter 4 Supply and Procurement
- Chapter 5 Liaison Officer, 2d Engineer Special Brigade in Oahu, T.H.
- Chapter 6 Sixth Army POM Inspection
- Chapter 7 Liaison Detachment, 532d Engineer Boat & Shore Regiment
at NABD, Port Hueneme, California.
- Chapter 8 2d Engineer Special Brigade Liaison Air Section.
- Chapter 9 Organization of Branch Seattle Port of Embarkation at Fort
Worden. Outloading of Equipment at Fort Worden.
- Chapter 10 Departure and Embarkation.

PART II - 1220th PROVISIONAL ENGINEER BATTALION

- Chapter 1 Administration
- Chapter 2 Supply

PART III - 854th TRANSPORTATION PORT COMPANY

- Chapter 1 Introduction
- Chapter 2 Action Taken in Selection of Officers and Enlisted Men.
- Chapter 3 Supply and Procurement.

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- Chapter 4 Reorganization
- Chapter 5 Advance Detachment
- Chapter 6 Additional Training
- Chapter 7 Liaison Officer
- Chapter 8 PCM Inspections
- Chapter 9 Preparation for Departure
- Chapter 10 Train Ride
- Chapter 11 Embarkation
- Chapter 12 Conclusion

PART IV - 461st TRANSPORTATION AMPHIBIOUS TRUCK COMPANY

- Chapter 1 Introduction
- Chapter 2 Action Taken in Selection of Personnel
- Chapter 3 Supply and Procurement
- Chapter 4 Reorganization
- Chapter 5 Advance Detachment
- Chapter 6 Additional Training
- Chapter 7 Liaison Officer
- Chapter 8 PCM Inspection
- Chapter 9 Preparation for Departure
- Chapter 10 Train Ride
- Chapter 11 Embarkation

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OPERATIONAL REPORT
TG 7.2 Activities from Debarkation to "P" Day

- Chapter 1 Forward Echelons
- Chapter 2 Debarkation
- Chapter 3 Organization ISCOM, Headquarters TG 7.2
- Chapter 4 Assignment of Construction Missions
- Chapter 5 Assignment of Special Duties
- Chapter 6 Logistics and Supply
- Chapter 7 Transportation
- Chapter 8 Security
- Chapter 9 Finance
- Chapter 10 Quartermaster and Ordnance
- Chapter 11 Light Aviation
- Chapter 12 Eniwetok and Parry Islands
- Chapter 13 Runit Island
- Chapter 14 Aoman-Biijiri-Rojoa Islands
- Chapter 15 Engebi Island
- Chapter 16 Navy Mobile Boat Pool # 1
- Chapter 17 Health and Sanitation
- Chapter 18 Troop Information and Education
- Chapter 19 Special Service and Recreation
- Chapter 20 Religion and Morality
- Chapter 21 Signal
- Chapter 22 Field Exchange # 511
- Chapter 23 Eniwetok Fuel Tank Farm

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OPERATIONAL REPORT

Activities from "P" Day Through "Z" Day Plus Two

- Chapter 1 Events leading up to and during "P" Day.
- Chapter 2 Activities before and after tests on Zero Islands.
- Chapter 3 VI P Observers

OPERATIONAL REPORT

TG 7.2 Activities in Roll-Up

- Chapter 1 General
- Chapter 2 Post Sandstone Garrison
- Chapter 3 Activities on Eniwetok and Parry Islands
- Chapter 4 Construction of permanent runways on Biijiri and Runit Islands
- Chapter 5 Dependents housing on Eniwetok Island

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OPERATIONAL REPORT - TASK GROUP 7.3

PLANS AND ORGANIZATION PHASE

1. Narrative.

Rear Admiral Francis C. Denebrink, U. S. Navy, was designated as Commander Naval Task Group on 23 October 1947. On 27, 28 and 29 October 1947, Admiral Denebrink inspected the test site in company with Commander Joint Task Force, Lieutenant General John E. Hull, U. S. Army, and others. Commander Naval Task Group then proceeded to Washington and engaged in conferences with Commander Joint Task Force and the Test Director concerning the proposed schedule of operations. Various phases of operation "SANDSTONE," as outlined in JCS file 1795/6 and 1795/7, were discussed and a schedule of operations drawn up. The Naval Task Group was given the responsibility for various commitments beyond those covered in the Joint Chiefs of Staff directives. As a result of these conferences, Commander Naval Task Group decided that additional ships beyond those allocated by the Joint Chiefs of Staff would be required to fulfill these commitments properly. The Naval Task Group, as originally constituted by JCS directives, consisted of 18 ships, 6 craft, 8 helicopters and a patrol unit, with a total complement of about 4500 men. In view of the requirements for additional ships, the Commander Naval Task Group requested that CNO assign the following ships to the Naval Task Group: (1), a water distillation ship (since all the estimates that water distillation capacity available afloat and ashore would be sufficient

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were based on optimistic calculations and did not leave a realistic margin for probable breakdowns of equipment);

(2), an additional cable-laying LSM (to assist LSM 250 in laying of submarine cable and to be available in case of casualty to LSM 250); and (3), a landing craft repair ship (ARL) (to assist COMSTOCK in keeping boat pool boats in running order, to repair landing ships and LCI assigned, and to provide needed repair facilities for forces ashore and afloat). CNO approved this request and PASIG (AW 3), LSM 378, and ASKARI (ARL 30) were assigned. All of these ships proved to be extremely valuable and were used for needed tasks other than their primary missions. For example, PASIG was used from the latter part of January to the middle of March as a shuttle tanker to bring black oil from Kwajalein to Eniwetok in order to provide sufficient oil for the destroyer and destroyer escorts on Off-shore Patrol. While on her first trip to Kwajalein, PASIG transferred two million gallons of potable water to Kwajalein for the use of personnel ashore on that island.

About 15 November 1947, the Task Force was designated Joint Task Force 7; the Naval Task Group was designated Task Group 7.3.

Later developments made necessary the augmenting of the Task Group by assigning two additional LCT and two AVR (63 foot) and also, because of several submarine contacts, the Off-shore Patrol Unit was increased by the addition of three destroyer escorts

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and three PB-1W (Navy operated B-17's equipped with special radar). The addition of the extra vessels to the Offshore Patrol Unit increased the rate of expenditure of fuel oil by such an amount that Comservpac was requested to furnish a station tanker; ASHTABULA was assigned for the last two weeks of March, and MISPILLION was assigned for the major portion of the remainder of the operation. An AF was also assigned temporarily by Comservpac at various times when needed. Another change in the originally planned composition of the Task Group was occasioned by nonavailability of two of the eight helicopters originally allowed. Also, one LCI, although originally allocated by the JCS, was not needed and its assignment was not requested by CTG 7.3.

With the addition of ships augmenting the Task Group, it increased in size until, just before the first test, the Task Group comprised a total of 28 ships, 11 craft, six helicopters, six patrol seaplanes, three large land patrol planes and two small landplanes (SNJ), with a total complement of about 5850 men. The ships totalled above included two FS (one dry stores and one reefer ship) of the U. S. Army Transportation Service which were permanently attached; in addition, at one time or another during the operation, three large cargo vessels, one LST, and one additional dry stores FS of USATS were under the operational control of CTG 7.3. Destroyer Division 11 (4 DD)

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also was under the operational control of CTG 7.3 during most of the month of March, until relieved by three destroyer escorts (DE) of Cortdiv 1.

The Task Organization, as finally set up on a permanent basis, was:

TASK ORGANIZATION

7.3 Naval Task Group, RADM DENEBRINK

- (a) 7.3.1 Flagship Unit, CAPT WARE
MT MCKINLEY (AGC 7) 1 AGC
- (b) 7.3.2 Main Naval Task Unit, ENIWETOK, RADM DENEBRINK
PICKAWAY (APA 222) 1 APA
WARRICK (AKA 89) (1), YANCEY (AKA 93) 2 AKA
CURTISS (AV 4), ALBERMARLE (AV 5) 2 AV
LST 45, 219, 611 3 LST
FS 211, 370 2 FS
- (c) 7.3.3 Off-Shore Patrol Unit, CAPT ASHCRAFT
GARDINERS BAY (AVP 39) 1 AVP
TUCKER* (DDR 875), ROGERS (DDR 876),
PERKINS (DDR 877) 3 DD
SPANGLER (DE 696), GEORGE ©(DE 697),
RABY (DE 698), MARSH (DE 699),
CURRIER (DE 700) 5 DE
VP(MS)-6 Detachment 6 PBM-5
VX-4 Detachment 3 PB-1W
AVR #C-26638, #C-26653 2 AVR
- (d) 7.3.4 Helicopter Unit, CAPT HARRIS
BAIROKO (CVE 115) 1 CVE
Helicopters assigned 4 HO3S
2 HTL
1 DE as required (from Off-shore Patrol)
- (e) 7.3.5 Service Unit, CDR EPPS
PASIG (AW 3) 1 AW
YW 94 1 YW
YOG 64 1 YOG
AO as assigned 1 AO
AF as assigned 1 AF
AOG as assigned 1 AOG

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(f) 7.3.6 Cable Unit, LCDR ROWAND, USCG

LSM 250, 378

2 LSM

Navy Signal Unit No. One

Boat Pool boats assigned (2 LCM, 1 LCP(L),
1 LCP(R), 2 PPB).

(g) 7.3.7 Boat Pool Unit, CDR HUFF

COMSTOCK (LSD 19)

1 LSD

ASKARI (ARL 30)

1 ARL

LCI 549, 1054, 1090

3 LCI

LCT 472, 494, 1194, 1345

4 LCT

Boat Pool boats assigned

(1) On reporting; now temporary duty with Servpac.

* ComdesDiv 52 embarked; TUCKER, ROGERS, PERKINS
are in Desdiv 52.

@ Comcortdiv 1 embarked; SPANGLER, GEORGE RABY,
MARSH and CURRIER constitute Cortdiv 1.

2. Major Difficulties Encountered and How Solved.

All the major difficulties encountered in "SANDSTONE" can be ascribed to a few principal causes: (1), shortness of time between the commencement of the operation and the target date; (2), location of Naval Task Group Headquarters in Pearl Harbor, with Main JTF 7 Headquarters in Washington; (3), extreme secrecy imposed; and (4), personnel difficulties, due to great number of enlistments expiring and to inexperience of personnel available. This latter factor is peculiar to the present period through which the entire Navy is now passing and will not be touched on further in this report.

The time available for planning for the operation was comparatively short for an operation as involved as "SANDSTONE," since the first shot was scheduled for a time less than six months after CTG 7.3 entered the picture. Consequently, the necessary alterations

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to certain vessels, the recommissioning of others, the readying and sailing of all vessels concerned, and the executing of many other of the early Task Group commitments went on simultaneously with the organizing of the Task Group and the planning for the entire operation. Not only did this, of necessity, tend to impose a "day to day" type of planning for the early operations, but this was superimposed on the over-all planning for the operation. Obviously, there was no sovereign remedy for such troubles; the only possible answer was to comply with the time schedule by impressing on all concerned the absolute necessity for meeting the target date. By thus securing the cooperation of all hands, the operation proceeded on schedule. The great speed required in order to meet the target date also engendered a possible threat to security. Dispatching of the first unit (COMSTOCK and the three LST) on schedule could only be achieved by much overtime work at Naval Shipyard Pearl Harbor. For more than a year, the authorizing of overtime work had been held to a very few special cases on order of the Secretary of the Navy. The sudden authorization of much overtime, without any accompanying relaxation of restrictions by the Secretary, could only point to a "hot Top Secret" operation, so tongues began to wag and many theories were aired as to employment of the ships. The press releases made in early December soon stilled such speculation.

Many planning difficulties were caused by the separation between the Main JTF 7 Headquarters in Washington, where most of the over-all planning for "SANDSTONE" was accomplished, and Task Group 7.3

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JOINT TASK FORCE SEVEN WASHINGTON DC
OPERATION SANDSTONE NUCLEAR EXPLOSIONS. ATOMIC WEAPONS TESTS. O--ETC(U)
1948

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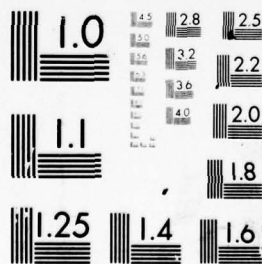


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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

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Headquarters in Pearl Harbor, where the Naval Task Group planning was done. This separation led to the exchange of many dispatches, letters and memoranda in an attempt to resolve difficulties in planning which could have been easily solved in a few moments over a conference table, if the headquarters of the Task Force and the Naval Task Group had been in the same location. These difficulties were ameliorated to some extent by the assignment of a J-3 representative to JTF 7 Forward Headquarters at Fort Shafter and the presence at JTF 7 Main Headquarters of a Task Group 7.3 representative. The latter, Captain Quackenbush, became ill in late December, however, and it was not practicable to replace him at JTF 7 Main Headquarters before these Headquarters moved to Fort Shafter in February.

The extreme secrecy in which the operation was conducted at first was the cause of many difficulties in providing logistics. Supporting commands, such as Naval Shipyard, Pearl Harbor, and Naval Supply Center, Pearl Harbor, were unable to disseminate information to a degree which would provide maximum efficiency in readying the ships for the operation, and Commanding Officers and Supply Officers of vessels engaged in "SANDSTONE" found difficulty in getting high enough priority for delivery of needed parts, etc., without violating security. An additional difficulty arose over carrying out directives concerning the submission and dissemination of movement reports for vessels and yet observe all security restrictions. This was solved by having the

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Officer in Charge of the Movement Report Center at Pearl Harbor execute the "SANDSTONE" security agreement and then work through him. All vessels operating out of Pearl Harbor disappeared from the Movement Report system at that port. Those coming from the West Coast came into Pearl Harbor on a regular restricted movement report and then disappeared from the Movement Report system by the device of clearing Pearl Harbor for "local operations," and thus did not require the broadcast of the movement to other movement report centers and commands.

3. Recommendations.

The following recommendations for operations of a nature similar to "SANDSTONE" are made:

- a. That plans for the operation be based on a target date which will permit orderly preparation and planning for the operation;
- b. That, during the planning stage, the Task Force Commander's Headquarters and the Headquarters of all important Task Group Commanders be in one location to permit frequent conferences;
- c. That, as early as practicable in the operation, security be reduced to a level approximating that governing "SANDSTONE" since late December 1947.

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PHASE TWO: OPERATIONS PRIOR TO MOVEMENT OF TASK FORCE
SHIPS FROM TERMINAL ISLAND
(15 November 1947 to 29 February 1948)

1. As stated in phase one of the operational report, one of the chief difficulties encountered in the over-all planning of the operation lay in the necessity for carrying out certain commitments while such planning was still in process. Hence there was no fine demarcation between the development of the details of the plan and the necessary implementation of the plan.

2. The task of providing logistic service for all personnel sent forward and the shipment of supplies, materials, and personnel, was continued in ever increasing amounts throughout the period prior to the departure of the main task unit from the West Coast. A large amount of tonnage was shipped from the West Coast, most of the ships being provided by Comservpac placed under the operational control of CTG 7.3. This included 1 AFA, 2 AKA, 4 LST, 3 FS, augmented by tankers, reefer ships, and cargo carriers assigned temporarily to operational control of CTG 7.3. The actual movement of individual ships is summarized in enclosure (B).

3. In November 1947, the advance group of ships, consisting of the COMSTOCK, LST 45, 219, 611, 1135, plus the COASTAL CRUSADER, FS 234 and 370, arrived at Eniwetok to establish a service unit and boat pool. During the period from the arrival of the first ships of the task force until the major vessels were assembled on berth

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in Terminal Island (15 February 1948), the following naval commitments were met:

a. Offshore patrol was established utilizing Destroyers and Destroyer Escorts, and planes of VP(MS)-6, with GARDINERS BAY acting as tender for the seaplanes. All units were equipped and loaded for offensive anti-submarine warfare if required. The patrol was established for ships and planes on 1 February. Because of submarine contacts which were made within the danger area it was deemed necessary to augment the offshore patrol. Accordingly, CTG 7.3 recommended to CJTF 7 that two additional DD/DE be obtained for the Offshore Patrol. (It was decided in March 1948, by Cincpacflt, CJTF 7 and CTG 7.3 that the Offshore Patrol would be increased by 3 DE to a total of 8 DD/DE). Each day, daylight searches were flown by VP(MS)-6, utilizing 1 plane daily for six days a week and a 5-plane search on 1 day a week. (For continuity, all submarine contacts will be summarized in the report of phase three operations.)

b. The Cable Unit, comprising LSM 250 and LSM 378, with Navy Signal Unit Number 1, commenced cable laying operations early in January. During the actual laying of cables there were several changes made to the original cable plan, and some duplication of effort resulted from use of defective cable. In all, 914,050 feet of cable were laid. This required the service of specially trained personnel in the preparation, loading, splicing, testing and laying of each

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cable. These personnel are being retained for the duration of operation SANDSTONE for maintenance and checking of cables, and are available to lay any replacement cables should this become necessary. A complete report of cable laying operations, including comments and recommendations, is given in Enclosure (C).

c. All vessels were unloaded, and personnel, equipment, and supplies were moved ashore. The equipment and personnel for the work at outlying islands were transshipped. LST were used to provide hotel services for construction workers at ENGEBI and in the AOMON-BIIJIRI and RUNIT area. In the execution of its assigned duties the 64 boats of the boat pool operated for a total mileage in excess of 21,000 miles on regularly scheduled trips during the period from 1 December 1947 to 15 March 1948. The total tonnage offloaded at ENIWETOK during this period was 33,742 M/T (14,591 long tons) cargo, consisting of 18,673 M/T of equipment and 15,069 M/T of supplies. The term equipment embraces vehicles, construction equipment, generators, radio equipment, unit property, etc. The term supplies includes subsistence, and construction materials, such as asphalt, cement, lumber, paint, cable, towers, etc. The tonnage figures do not include the weight of any craft assigned to the boat pool. These craft, in several instances, comprised a full deck load for a cargo carrying vessel. In addition to the above, 1006 passengers were transported to ENIWETOK in TG 7.3 vessels. In January, two LCI were assigned to ferry duties between ENIWETOK and

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ENGEBI and a schedule of two runs daily in each direction was put into effect. These ferries transported an average of about 1200 passengers per month.

d. The Air Task Group (TG 7.4) was transported to KWAJALEIN in PICKAWAY, YANCEY and casual shipping; the total lift to KWAJALEIN was about 23,000 measurement tons and about 1700 persons.

e. Small boat channels were surveyed and the boat channels buoyed at Eniwetok, Farry, Engebi, Aomon, Runit, and Rujoru Islands; in several cases it was necessary to do considerable blasting and dredging to develop a suitable channel. Small craft landings were constructed at all of the islands listed above.

f. Navigational aids were checked, improved, relocated where out of position, and correct hydrographic information was disseminated.

g. A seadrome suitable for both day and night operations was developed off Farry Island by GARDINERS BAY.

h. A special lighted buoy channel was laid for the AVR runs, with the "firing" personnel, between Engebi and Farry Islands.

i. MT. MCXINLEY, ALBEMARLE, CURTISS and BAIROKO were assigned Navy Yard availability at Terminal Island Naval Shipyard to prepare these vessels for their mission. Laboratories for technical personnel and special communication equipment were installed

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during their availability. Various echelons of the joint task force were moved aboard and special supplies and equipment prepared and moved aboard.

j. All supplies provided through Naval Supply Center, Pearl Harbor, and all loading of vessels accomplished by Naval Supply Center, Pearl Harbor were handled on highest priority so as to expedite the fulfillment of all tasks assigned to the Commander Naval Task Group.

k. About 6500 naval personnel were handled by security personnel to establish clearances for all naval personnel in the Naval Task Group.

4. On 15 February, Commander Naval Task Group, Rear Admiral Denebrink, and staff moved to Terminal Island and Rear Admiral Denebrink hoisted his flag in MT. MCKINLEY.

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MONTHLY OPERATIONAL SUMMARY

DATE

November

- 15 COMSTOCK (LSD 19), LST 45, 219, 611, and 1135 reported for operational control.
TU 7.3.3, Service Unit, CDR HUFF in COMSTOCK, with LST 45, 219, and 611, departed for Flatcar.
- 17 USAT COASTAL CRUSADER reported for operational control.
- 18 TU 7.3.11, Supply Unit, COASTAL CRUSADER, G. B. SMITH, Master, departed for Flatcar.
- 19 TU 7.3.12, Supply Unit, LST 1135, LTJG R. C. WHALIN, USN, departed for Flatcar.
- 25 USAT FS 234 reported for operational control.
- 26 TU 7.3.13, Supply Unit, USAT FS 234, A. A. CURTICE, Master, departed for Blockhouse, CTG 7.3 departed for Flatcar by air.
- 28 TU 7.3.14, Supply Unit, FS 370, H. C. JONES, Master, reported for operational control and departed for Flatcar. CTG 7.3 arrived at Flatcar.
- 29 COMSTOCK, LST 45, 219, 611 and COASTAL CRUSADER arrived Flatcar from Pearl; LCI 549 and YW 94 arrived Flatcar from Blockhouse. CTG 7.3 hoisted flag in COMSTOCK.

December

- 1 LST 1135 arrived Flatcar for unloading.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

December

- 1 NEMASKET (AOG 10) (Comservpac control) arrived Flatcar as Station Tanker.
- 3 CHOWANOC (ATF 100) Flatcar to Blockhouse.
LST 611 Flatcar for Pearl, ETA 16 December.
- 4 LST 45 and 219 at Engebi as Station barracks and Warehouse ships.

LCI 549 arrived Flatcar from Blockhouse.
YW 94 at Flatcar, will remain to issue water on station.
AG 135 departed Blockhouse, discharged special shipment from Merapi.
- 6 RABY (DE 698), TU 7.3.15, departed Pearl for Blockhouse as Air-Sea Rescue Ship.
- 7 CTG 7.3, RADM Denebrink hauled down his flag in COMSTOCK and departed Flatcar for Pearl; arrived Pearl 7 December WLD.

CTU 7.3.2, Captain Burrowes, USN, assumed duties as Naval Task Group representative at Flatcar.
- 8 USAT FS 370 arrived Flatcar, will remain as Reefer ship.
USAT FS 234 arrived Blockhouse; will be dry stores shuttle ship between Blockhouse and Flatcar.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

December

- 9 LSM 250 departed Hueneme to rendezvous AGAWAM and proceed to Pearl.
- 10 AGAWAM from Oakland to Pt. Conception, to rendezvous with LSM 250.
LST 857 from Idway to Flatcar, to move natives.
- 11 LST 1135 from Flatcar to Pearl, to transfer to Philippine Government.
YANCEY from Port Townsend to Flatcar, to discharge.
CHOWANOC (ATF 100) departed Pearl towing YCV 17 to Flatcar.
- 12 ASKARI (ARL 30) from Pt. Conception to Pearl en route Flatcar.
- 16 RABY (DE 698) arrived Flatcar for duty.
- 19 LSM 250 arrived Pearl, reported to CTG 7.3.
LSM 378 reported for duty at Pearl.
USAT LST 553 reported for duty at Pearl.
LST 1135, ComHawSeaFron assumed operational control at 192344 under SAR procedure.
WARRICK arrived Pearl; reported for operational control.
PICKAWAY made rendezvous with pilot boat at Pearl where Commander SCHADE briefed CO, and two patients were transferred. Proceeded to Flatcar with no change in ETA.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

December

- 20 LST 553 departed Pearl for Flatcar.
LST 857 arrived Flatcar to load natives.
- 21 LST 357 departed Flatcar for Ujelang.
- 22 ASKARI arrived Pearl; reported for operational control.
Granted availability at NSY.
- 23 LST 857 departed Ujelang for Blockhouse.
FS 234 departed Blockhouse for Flatcar.
- 24 YANCEY arrived Flatcar.
FS 234 arrived Flatcar.
- 25 LST 857 arrived Blockhouse.
CHOWANOC (ATF 100) towing YCV 17 arrived Flatcar.
- 26 LST 857 departed Blockhouse for Pearl.
- 27 ATF 85 departed Blockhouse for Flatcar.
- 28 WARRICK arrived Flatcar.
PICKAWAY arrived Flatcar.
USAT MARSHALL VICTORY departed Hueneme for Flatcar.
RADM Denebrink hoisted flag in COMSTOCK 280820.
ATF 85 arrived Flatcar.
ATF 85 with tows departed Flatcar for Guam.
- 30 COASTAL CRUSADER arrived Pearl and was given orders to
return to Army control.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

December

- 30 ASKARI (ARL 30) departed Pearl for Flatcar.
RABY (DE 698) departed Flatcar for Blockhouse.
- 31 LST 611 departed Pearl for Flatcar.
RABY (DE 698) arrived Blockhouse.

January

- 1 LSM 250 and LSM 378 arrived Flatcar; reported to CTU 7.3.2;
further directed to report to CTU 7.3.6 (LCDR ROWAND) for
duty in CABLE UNIT.
USAT LST 553 arrived Eniwetok for unloading.
RADY DE 698 arrived Eniwetok having fueled at Kwajalein.
PICKAWAY departed Eniwetok for Pearl.
- 3 FS 370 departed Eniwetok for Kwajalein.
- 4 FS 370 arrived Kwajalein.
- 6 LST 553 departed Eniwetok for Kwajalein for unloading.
YANCY departed Eniwetok for Pearl.
- 7 SPANGLER (DE 696) departed Pearl for Kwajalein.
- 8 PICKAWAY arrived Pearl; departed same day for San Diego.
- 9 USAT MARSHALL VICTORY arrived Eniwetok.
ASHTABULA (not under CTG 7.3) departed Pearl for Eniwetok.
- 10 HECTOR (AR 7) arrived Eniwetok.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

January

- 11 COMSTOCK (LSD 19) transferred boat pool to HECTOR.
CTU 7.3.2 now CO, HECTOR.
SPANGLER diverted to Eniwetok, omitting call at Kwajalein.
ASKARI (ARL 30) arrived Eniwetok.
FS 370 arrived Eniwetok.
- 12 LST 611 arrived Eniwetok.
COMSTOCK (LSD 19) departed Eniwetok for Yokosuka to pick
up 3 LCT and 6 LCM.
- 13 YANCEY arrived Pearl.
- 14 YANCEY departed Pearl for Oakland.
USAT FS 211 arrived Honolulu from Fort Worden, Washington;
voyage repairs and loading require delay in RFS until
26 January.
RADM Denebrink hauled down flag and departed Eniwetok
for Pearl.
PASIG (AW 3) sailed San Diego for Eniwetok.
- 15 PERKINS (DD 877) sailed San Diego for Pearl.
SPANGLER (DE 696) arrived Eniwetok.
- 16 PASIG diverted to Pearl to load 5 planes.
USAT FS 211 reported for operational control.
LST 611 departed Eniwetok for Kwajalein.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

January

- 17 PICKAWAY arrived San Francisco.
 GRAFFIAS departed San Francisco.
 LST 611 arrived Kwajalein.
- 18 ASHTABULA arrived Eniwetok.
 LCI 1054 - 1090 departed Kwajalein for Eniwetok.
- 19 FS 234 departed Eniwetok for Kwajalein.
 LCI 1054 - 1090 arrived Eniwetok.
- 21 GARDINERS BAY arrived Pearl and reported for duty.
 VF(MS)-6 reported for operational control.
 YANCEY arrived Mare Island for restricted availability.
 PERKINS arrived Pearl.
 COMSTOCK departed Yokosuka for Kwajalein.
 FASIG arrived Pearl.
 FS 211 arrived Pearl.
- 22 GARDINERS BAY and PERKINS departed for Eniwetok.
- 23 FASIG departed for Eniwetok.
- 24 USAT FS 211 completed loading at NSC Pearl, shifted for
 repairs, expected RFS 26 January.
 FS 234 arrived Kwajalein.
- 25 ASHTABULA, WARRICK, MARSHALL VICTORY departed Eniwetok,
 MARSHALL VICTORY reporting to appropriate Army Command
 for operational control.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

January

- 26 FS 211 departed Pearl for Eniwetok.
- 28 AGAWAM (AOG 6) arrived Eniwetok; offloading slow due
high winds.
- 29 GARDINERS BAY, PERKINS arrived Eniwetok.
COMSTOCK arrived Kwajalein.
- 30 FS 234 departed Eniwetok for Kwajalein to meet LATONA.
COMSTOCK departed Kwajalein for Eniwetok.
- 31 GRAFFIAS (AF 29) and LATONA (AF 35) granted authority to
enter Danger Area.

February

- 1 GRAFFIAS (AF 29) arrived Eniwetok.
COMSTOCK arrived Eniwetok carrying LCT 1194 and 1345.
- 2 WARRICK arrived Pearl reported to Comservpac for opera-
tional control.
LST 219 departed Eniwetok for Pearl.
- 3 GRAFFIAS departed Eniwetok for Saipan.
- 4 PASIG arrived Eniwetok.
- 5 USAT SYLVESTER ANTOLAK and FS 211 arrived Eniwetok.
RADM Denebrink hauled down his flag and departed Eniwetok.
- 8 LST 611 arrived Pearl; granted 10 days availability for
voyage repairs, to load AVR and supplies.

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MONTHLY OPERATIONAL SUMMARY (contd)

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February

- 9 YANCEY departed Oakland ETA Eniwetok 232000.
- AEC Representative at Eniwetok reported that a large percentage of rubber covered 3-conductor cables (Type 104), have proven to be defective on prelaying test or on test after laying; he recommended that spare 10-conductor armored cable (Type 115P) be Utilized for proposed Type 104 cable runs as far as practicable, laying additional Type 115P cable as required. It was stated that additional cable was needed to permit carrying out the foregoing plan and to provide necessary spare cable. This plan was approved, and 250,000 feet of additional Type 115P cable procured at Pearl for shipment; 150,000 feet of this cable is to be lifted by LST 611, ETD Pearl 20 February, and the remaining 100,000 feet via LST 219, ETD Pearl 3 March.
- 10 SGT. SYLVESTER ANTOLAK departed Eniwetok en route Yokohama.
- 11 PASIG departed Eniwetok for Kwajalein to deliver 1 million gallons water and fuel to capacity.
- USAT FS 234 Eniwetok for Pearl.
- 12 PASIG arrived Kwajalein.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

February

- 13 LST 219 arrived Pearl.
LATONA (AF 35) arrived forenoon at Eniwetok and departed same day.
- 14 CTG 7.3 and Staff departed Pearl for Terminal Island by air; Commander Schade designated CTG 7.3 representative at Pearl Harbor.
FASIG completed delivering 2,000,000 gallons of fresh water to Island Commander, Kwajalein, refueled and returned to Eniwetok, arriving on 25 February.
- 15 CTG 7.3 and Staff arrived Terminal Island, CTG hoisted flag in MT. MCKINLEY. MT. MCKINLEY, BAIROKO, ALBEMARLE and CURTISS reported to CTG 7.3 for operational control.
- 20 LST 611 departed Pearl for Eniwetok; LST 611 is lifting AVR #26638 and #26653 to Eniwetok.
NEMASKET (AOG 10) departed Pearl for Eniwetok to offload aviation gasoline.
RABY reported a sonar contact at 1357 Mike, bearing 252°T, distance 26 miles from the center of Eniwetok Atoll.
PERKINS joined RABY in tracking the probably submarine contact. Contact was lost at 1951 Mike; without submarine

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DATE

February

- being sighted visually at any time. The evaluation of contact is a "PROBABLE" submarine at deep submergence.
- 21 BAIROKO departed Terminal Island for San Diego to load avgas, ammunition, helicopters, planes, and embark helicopter unit; arrived San Diego 22 February.
- 22 YANCEY arrived Eniwetok; FICKAWAY arrived Kwajalein.
- 23 FS 234 arrived Pearl and reported to USARPAC for operational control.
- 24 RABY reported a sonar contact at 2023 Mike, bearing 097°T, distance 17 miles from the center of Eniwetok Atoll. SPANGLER also picked up the contact for a short period, but lost it and was unable to regain contact. RABY lost contact at 0943 Mike, 25 February. The evaluation of this contact a "POSSIBLE" submarine at deep submergence.
- 25 PICKAWAY completed unloading at Kwajalein and proceeded to Eniwetok, arriving 26 February.
- YANCEY completed unloading at Eniwetok and departed for Kwajalein; arrived Kwajalein on 26 February.
- COMDESDIV 52 in DUNCAN, with ROGERS, reported to CTG 7.3 for operational control.

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MONTHLY OPERATIONAL SUMMARY (contd)

DATE

February

- 26 BAIROKO completed loading at San Diego and proceeded to Terminal Island.
- 27 PASIG departed Eniwetok and arrived Kwajalein on 28 February.
- 29 Task Unit 7.3.2 (Rear Admiral F. C. DENEBRINK, USN) in MT. MCKINLEY, with CURTISS, BAIROKO and DUNCAN departed Naval Shipyard Terminal Island for Eniwetok, via Pearl. CTG 7.1 reported that loading of ALBEMARLE and CURTISS with SCIENTIFIC GROUP personnel, equipment and material had been completed; CTG 7.6 reported that loading of BAIROKO with RADIOLOGICAL SAFETY GROUP personnel was complete.

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CTU7.3.6/A9

19 April 1948

Serial: 0018

S-E-C-R-E-T

From: The Commander Naval Task Unit 7.3.6.

To: The Commander Naval Task Group 7.3.

Subject: Report of Submarine Cable Operations.

Reference: (a) Annex B to ComTaskGroup 7.3 Operation
Plan No. 1-48.

Enclosure: (A) Submarine Cable Data, Eniwetok Atoll (Secret
Pages 1 to 8 inclusive).
(B) Chart showing location of cables. (Secret,
limited distribution. Portions of H. O.
Field Charts 2009 - 2010 - 2011).

1. This report summarizes the work performed in connection with the installation of the submarine and underground cables outlined in reference (a). Copies are inclosed herewith for further distribution as deemed advisable.

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2. Cable Data.

- (a) Inclosure (A) contains a schematic diagram of all submarine cables and underground connections thereto, and tabulated data covering the types, lengths, electrical measurements and other pertinent data. At the request of Dr. J. C. Clark diagrams covering the arrangement of cables in the terminal boxes were submitted separately to CTG 7.1 for incorporation in AEC drawings covering the complete AEC network.
- (b) Inclosure (B) shows the actual location of the submarine cables as plotted by the Navigating Officers of the LSM-250 and LSM-378. At a conference with CTG 7.1 representatives it was

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suggested that distribution of these charts
be limited. Working copies are already in
possession of this unit, the LSM-250 for use
if repairs should become necessary. Copies
have previously been exchanged with CTG 7.3
(via Capt. Burrowes) as the work progressed,
and the last copy submitted shows all cables.
One additional copy is inclosed herewith for
further transmittal to CJTF-7 and a copy has been
enclosed with a copy of this report for CTG 7.1.

Note: Inclosure B has been filed with ASFWP
under the general category: "Papers of
direct and continuing importance to
Eniwetok Proving Ground."

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3. Summary of Cable Laying Operations.

- (a) Actual cable operations were commenced on 5 January 1948. The last submarine cable for the AEC network was laid on 9 March and the underground connections thereto were completed on 17 March 1948. All cables were tested, found to be in good operating condition and turned over to representatives of TG 7.1 on 17 March 1948. Tabulated data covering the location, length and date each cable was laid is contained in Enclosure (A).
- (b) This unit also assisted personnel of TG 7.1 in laying and splicing Type RG-18 U coaxial cables on Engebi, Acomon and Runit Islands as directed in Paragraph 1 (b), (5), (11) and (12) of reference (a). This work was completed on 25 March

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1948. No data is submitted covering these cables as the cable was furnished, terminated and tested by TG 7.1.

- (c) Three telephone cables were laid between Eniwetok and Parry Islands for TG 7.2 as directed in Paragraph 1 (b), (10) of reference (a). The first cable was furnished, loaded and spliced by the Signal Corps and laid under the supervision of CTU 7.3.6 on 17 January 1948. This cable was found to have several faults and after unsuccessful attempts to make repairs was deemed of unsuitable type and abandoned. With the approval of Dr. Clark of TG 7.1 two Type 104 cables were laid on 24 and 26 March. These

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cables are 37,500 and 23,500 feet in length respectively, with a 250 foot shore end of armored Type 113 cable on the Eniwetok end of each cable to reduce abrasion on the coral reefs at the landing point. These cables were terminated and turned over to TG 7.2 in good operating condition on 27 March 1948. This completed cable laying operations by this unit.

4. Summary of Cable Expended.

- (a) The quantities of the various types of cable received and expended, and the disposition made of the remaining cable is tabulated on page 8 of Enclosure (A).

5. Cables and Small Craft.

- (a) All cables except the Eniwetok - Parry Island telephone cables were laid from the LSM-250

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and LSM-378. These ships had previously been fitted out for cable laying at the Terminal Island and Pearl Harbor Naval Shipyards respectively, under BuShips direction. The cable was coiled on the main deck and an "A" frame, with a large block mounted at the apex provided a fairlead directly over the coil. From this block the cable lead through a series of blocks and a snubbing device on the superstructure deck to a block on an outrigger which projected from the ship's side forward. Duplicate fairleads, snubbing devices and outriggers made it possible to pay out the cable from either side. The cable was always laid from the weather side. An electrically driven cable

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drum mounted forward on a bridge between the superstructure decks provided a means of hauling the cable aboard for loading or recovery. Drawings are on file at BuShips covering the above special equipment. It was found that the cable could be loaded in a very satisfactory and expeditious manner. No trouble was experienced in paying out the cable through the fairleads and outriggers provided, and the snubbing devices provided the desired tension in any depth of water encountered during operations.

- (b) The principle difficulty encountered with the LCM's was that of keeping the ship on the desired course under prevailing wind conditions

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without paying out cable at an excessive speed. It was found necessary to run at speeds between 4.5 and 6 knots, whereas a laying speed of 3 knots is considered safer and more desirable. However no damage to the cable or the equipment resulted from the increased speed.

- (c) The use of LSM's for making repairs or recovering cable previously laid did not prove too satisfactory. It was found impossible to maneuver the ships under prevailing wind conditions in such a manner that excessive strain was not placed on the cable during dragging or recovery operations. The cable winch also lacks sufficient power to haul in

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deep water against the wind. Should extensive repairs, rearrangement or extension of these cables become advisable for future operations it is recommended that a small cable repair ship of conventional type be obtained or fitted out for the purpose. This ship should be fitted out with bow sheaves, a heavier cable winch equipped with dynamometer and the ship should be of a type as maneuverable as possible under prevailing wind conditions.

- (d) Where the presence of coral reefs made it impractical to land the LSM's on the beach the shore ends of the cables were laid with LCM's with excellent results. All Eniwetok -

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Farry Island telephone cables were also laid with LCM's. In laying the type 104 cable in deeper water with LCM's some difficulty was originally encountered. To avoid straining the cable, which is unarmored and has rather low tensile strength a relatively low laying tension was employed. Upon reaching depths exceeding 10 fathoms it was found that the cable was paying out faster than the LCM was progressing, and considerably more cable was being used than should be necessary. This condition was remedied by the use of rope stoppers, which proved an effective means of controlling tension on the smooth rubber jacketed cable. This method should not be

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used however on armored cables as it causes
the jute to break and jam in the stoppers.

6.

Cable Types and Design.

- (e) The use of the 10-conductor armored Type 115-P cable and the 3-conductor armored Type 113 cable proved quite satisfactory, and these types of cable were laid with little difficulty. The use of 3-conductor rubber jacketed Type 104 cable proved unsatisfactory under the conditions encountered and its use was abandoned. The first two cables laid tested faulty due to defects in the cable which were not evident on preliminary dry tests. The next two cables laid were immersed and tested in an old evaporator tank filled

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with water. While a considerable number of defects were eliminated in this manner it was difficult to get the water between the layers of cable due to the gasket effect of the rubber jacket, and one fault was discovered during subsequent laying operations. When repairs to these cables were attempted after laying it was found to be a very slow and difficult operation to raise the cable without additional damage on the sharp coral heads. It also became evident that the reliability of this type of cable under the bottom conditions encountered was questionable. Therefore after a conference between representatives of CTG 7.1 and CTU 7.3.6 the use of

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type 104 cable was abandoned and Types 113
and 115-P cable substituted.

- (b) In future operations of this nature where time permits the manufacture of submarine cable designated for the operation is recommended. It is suggested that No. 14B & S stranded conductors be insulated with a 3/64" wall of high grade submarine type insulation, and the insulated conductors laid up as "spiral-four quads." The use of rubber instead of thermoplastic insulation would reduce the capacitance and other electrical losses and spiral four construction would largely eliminate crosstalk or crossfire between conductors. Three, four, or seven quad cable could be laid up economically,

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depending on whether 12, 16 or 28 conductors were desired. The use of a smaller number of cables with more conductors per cable would reduce congestion in the landing areas and simplify both installation and maintenance. The use of a 5/64" thermoplastic jacket, rubber filled tape, No. 10 BW armor and inner and outer jute serves similar to those provided in the Type 115-P cable is recommended. Examination of several harbor defense cables laid on the exposed end of Parry Island during the war indicates that the thermoplastic jacket offers excellent resistance to abrasion on the coral reefs, even after partial disintegration of the armor, and its continued use is recommended.

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7. Cable Repairs.

- (a) Several repair operations were necessary during the progress of the installation, due to damage from anchoring, landing craft, defective cable and other causes. While in each case repairs were successfully accomplished the tendency of the cable to foul and cut on the sharp coral heads prevalent in this area made repair operations slow and difficult. Under some conditions in deeper water they might be almost impossible, necessitating partial or complete replacement, particularly if time was an important factor. For that reason a 65,000 foot spliced length of Type 115-P cable was coiled down on the

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beach at the LSM landing at Parry Island. This cable could be loaded and laid in from 24 to 36 hours, and it is long enough to replace any individual length of submarine cable in the existing network. Upon completion of current operations it will be covered with canvas and sand, fenced and posted, and available for future operations.

- (b) Should future repairs be necessary a suitable repair ship, as outlined in Para. 5 (c) is recommended. However under the bottom conditions prevailing in the Eniwetok Lagoon repairs will be slow and difficult regardless of the type of ship employed. Experience during current operations indicates that either

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recovery or under running of the cable for any great distance is impractical and ruins the cable. Dragging operations are also slow and difficult. Therefore any faults should be located as closely as possible by bridge measurements before commencing repair operations. A tone should then be applied to the end of the cable and the cable itself located as close to the measured fault as possible with a finder coil, amplifier and detecting device. BuShips Model OBB Cable Detecting Equipment was found very satisfactory for this purpose. By following the above procedure it was found possible to drag and lift the cable

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close to the fault. If it was found impractical to take in cable from the point where the cable was lifted to the fault, the cable was cut and tested in both directions and the good end was buoyed. The cable was lifted again in a similar manner on the other side of the fault and a new section of cable spliced in between the two points. This obviated the necessity of raising more than a short length of cable. Where multiple faults occur or loss of shore ends prevents placing a tone on the cable it is quite conceivable that repairs will be impractical and complete or partial replacement necessary.

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- (c) Except for possible replacement of shore ends, or damage due to anchoring in the cable area, cable once laid successfully should be subject to but little physical damage or deterioration for a considerable period of time. However little data or experience is available relative to the electrical stability over long periods of time of submarine splices in thermoplastic insulation of the type used in Type 115-F cable. However this can be determined by making periodic tests of the insulation resistance and noting any pronounced downward trend of the resistance. If the cable network is tested and inspected occasionally and new shore ends

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installed when required it should be possible to keep the cables in operating condition over a considerable period of time, the exact period depending on the electrical stability of the splices and the life of the armor in this area. As the life of armor wire varies materially in different localities any estimate of the expected life would be little more than a guess.

H. E. ROWAND

Copy to:
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SUBMARINE CABLE DATA
ENIWETOK ATOLL
(pages 1 to 8 inclusive)

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Enclosure (A) to CTU 7.3.6 Secret ltr. file CTU7.3.6/A9 Serial C018
dated 19 April 1948.

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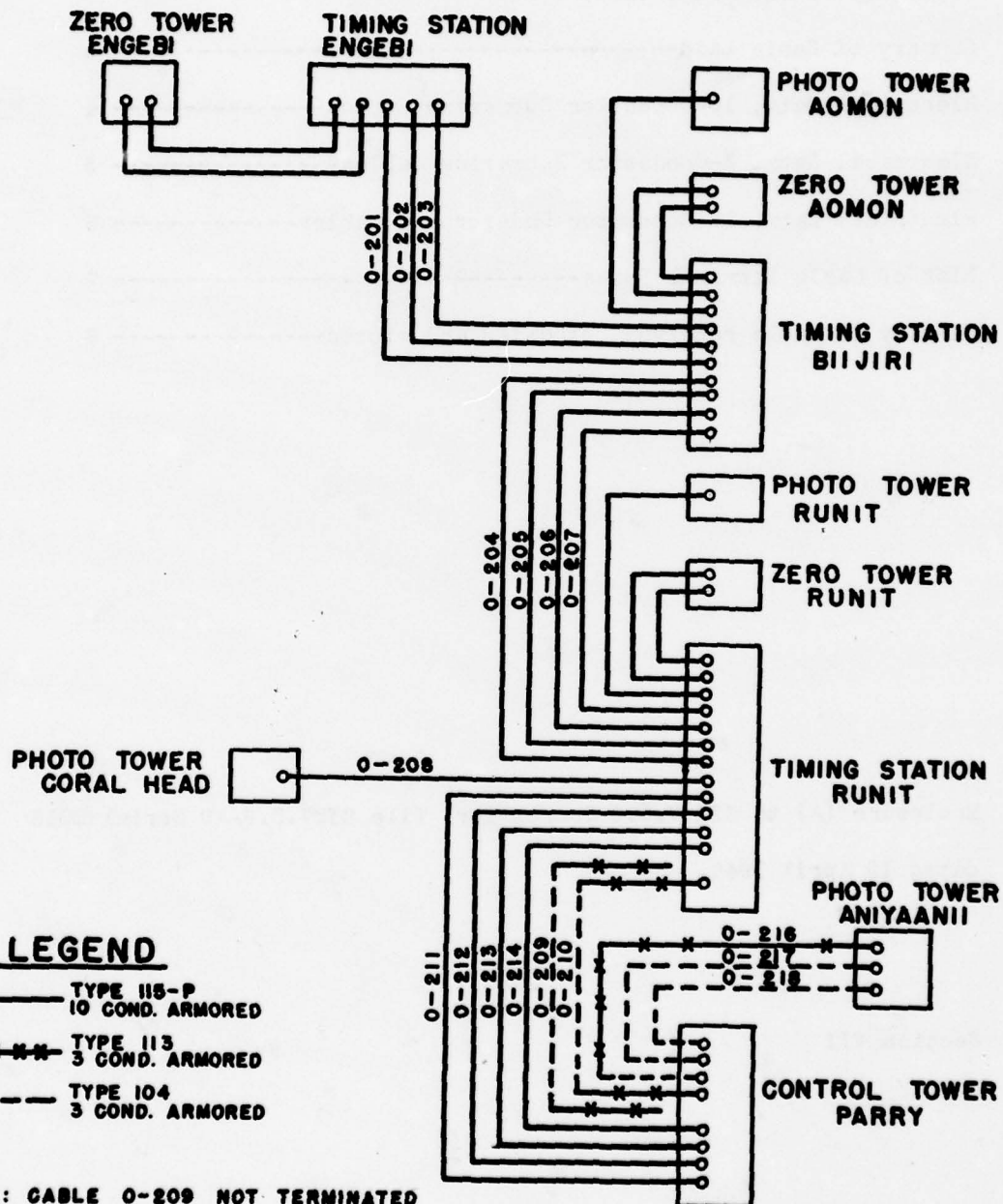
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SCHEMATIC OF SUBMARINE CABLE SYSTEM



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SUMMARY OF CABLE LAID BY COMMANDER TASK UNIT 7.3.6

SUBMARINE CABLES

CABLE NO.	FROM	TO	TYPE	NO. CONDUCTOR	APPROXIMATE LENGTH FEET	DATE LAID	AVERAGE RESISTANCE ohms per single conductor
O-201	T - ENGEBI	T - BIJIRI	115-P	10	47,500	1-29-48	109.7
O-202	T - ENGEBI	T - BIJIRI	115-P	10	46,800	1-20-48	106.3
O-203	T - ENGEBI	T - BIJIRI	115-P	10	48,400	1-19-48	110.8
O-204	T - BIJIRI	T - RUNIT	115-P	10	42,000	1-15-48	98.8
O-205	T - BIJIRI	T - RUNIT	115-P	10	38,000	2-24-48	86.2
O-206	T - BIJIRI	T - RUNIT	115-P	10	38,500	1-17-48	90.9
C-207	T - BIJIRI	T - RUNIT	115-P	10	38,000	1-27-48	90.9
O-208	T - RUNIT	Ph - CORAL HEAD	115-P	10	44,000	2-20-48	101.8
*O-209	T - RUNIT	C - PARRY	113	3	6,400	2-2-48	60.5
			104		56,400		
O-210	T - RUNIT	C - PARRY	113	3	5,100	1-30-48	56.7
			104		55,700		
O-211	T - RUNIT	C - PARRY	115-P	10	61,000	1-10-48	143.0
O-212	T - RUNIT	C - PARRY	115-P	10	38,000	1-13-48	139.7
O-213	T - RUNIT	C - PARRY	115-P	10	57,750	1-27-48	132.8
O-214	T - RUNIT	C - PARRY	115-P	10	57,000	3-9-48	129.9
O-215	Ph - ANIYAANII	C - PARRY	113	3	30,800	2-14-48	23.0
*O-216	Ph - ANIYAANII	C - PARRY	104	3	41,900	2-9-48	38.4
*O-217	Ph - ANIYAANII	C - PARRY	104	3	44,900	2-6-48	41.9

UNDERGROUND CABLES

Z - ENGEBI	T - ENGEBI	115-P	10	4,200	3-1-48	10.52
Z - ENGEBI	T - ENGEBI	115-P	10	44,200	3-1-48	10.61
Z - AOMON	T - BIJIRI	115-P	10	4,200	3-17-48	10.25
Z - ACHON	T - BIJIRI	115-P	10	4,200	3-17-48	9.45
Ph - AOMON	T - BIJIRI	115-P	10	4,400	3-17-48	10.70
Z - RUNIT	T - RUNIT	115-P	10	4,200	3-9-48	10.39
Z - RUNIT	T - RUNIT	115-P	10	4,200	3-9-48	9.79
PH - RUNIT	T - RUNIT	115-P	10	4,800	3-9-48	11.40
				34,400		

*One conductor has low insulation resistance.

Legend: T - Timing Station. Z - Zero tower.
Ph - Photo Tower.

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ELECTRICAL DATA
10-CONDUCTOR SUBMARINE CABLES

CABLE NO.	Copper Resistance per pair, ohms					Insulation resistance to ground - per pair megohms				
	A-B	C-D	E-F	G-H	J-K	A-B	C-D	E-F	G-H	J-K
O-201	216.8	219.4	219.6	219.2	218.9	2.5	1.7	1.2	1.7	1.9
O-202	210.5	212.4	212.8	213.2	212.3	3.6	1.0	0.79	0.74	0.75
O-203	218.3	221.8	221.0	222.4	220.9	2.8	1.4	1.45	1.5	1.9
O-204	195.4	197.6	198.1	197.4	197.0	4.2	0.90	0.68	0.63	0.63
O-205	172.7	172.6	172.1	172.4	172.0	3.7	0.075	0.070	0.075	0.040
O-206	180.2	181.4	181.4	182.1	181.8	6.5	5.0	5.0	4.2	6.5
O-207	179.5	181.7	181.9	181.7	181.6	4.5	4.5	3.5	4.1	7.5
O-208	200.4	203.4	203.8	203.9	203.4	2.8	1.1	0.75	0.67	0.77
O-211	284.8	285.5	286.0	285.9	286.5	2.5	0.70	0.37	0.43	0.38
O-212	278.1	278.2	280.0	280.2	279.2	2.2	0.29	0.30	0.28	0.29
O-213	263.3	264.6	265.3	265.8	266.0	2.6	0.60	0.37	0.42	0.38
O-214	259.1	259.6	260.6	258.9	259.6	0.90	0.80	0.75	0.60	0.025

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ELECTRICAL DATA
3-CONDUCTOR SUBMARINE CABLES

CABLE NO.	Copper resistance per conductor ohms			Insulation resistance per conductor megohms		
	A	B	C	A	B	C
O-209 *	60.5	60.5	60.6	40	1	0.001
O-210	56.3	56.7	56.8	38	40	43
O-215 **	28.51	28.38	28.43	102	102	102
O-216	38.38	38.39	38.40	0.03	84	84
O-217	41.90	41.90	41.92	84	0.018	84

* This cable is not terminated at either end - 2 conductors leaky.

** All type 113 - 3-conductor armored cable.

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ELECTRICAL DATA
10-CONDUCTOR UNDERGROUND CABLES

LOCATION	Copper resistance per pair ohms					Insulation resistance to grd. per pair megohms				
	A-B	C-D	E-F	G-H	J-K	A-B	C-D	E-F	G-H	J-K
Zero Tower, Engebi #1	20.99	20.96	21.02	21.11	21.07	1.0	1.1	0.80	0.88	1.5
Zero Tower, Engebi #2	20.71	21.34	21.21	21.24	21.05	1.3	1.1	0.79	1.1	1.3
Photo Tower Acomon	21.40	21.30	21.62	--	--	24.0	22.0	20.0	--	--
Zero Tower Acomon #1	20.32	20.43	20.51	20.42	20.60	16.0	13.0	7.5	15.0	16.0
Zero Tower Acomon #2	18.50	18.94	18.89	18.87	18.90	17.0	13.0	10.0	14.0	18.0
Photo Tower Runit	22.58	22.49	23.16	--	--	4.2	1.2	1.0	--	--
Zero Tower Runit #1	20.33	20.84	20.76	20.93	20.57	5.0	3.7	3.6	3.0	4.5
Zero Tower Runit #2	19.19	19.53	19.54	19.62	19.57	3.3	3.5	2.6	3.1	4.8

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LIST OF CABLE TERMINAL BOXES INSTALLED BY TASK UNIT 7.3.6

<u>NO.</u>	<u>LOCATION</u>	<u>CAPACITY CONDUCTORS</u>	<u>KEY NO.</u>
1	ZERO TOWER, ENGEBI	20	GN - 8263
2	TIMING STATION, ENGEBI	60	GN - 7214
3	PHOTO TOWER, AOMON	5	GN - 8199
4	ZERO TOWER, AOMON	20	GN - 7185
5	TIMING STATION, BIJIRI	120	GN - 7740
6	PHOTO TOWER, RUNIT	5	GN - 7689
7	ZERO TOWER, RUNIT	20	GN - 7819
8	TIMING STATION, RUNIT	120	GN - 7628
9	PHOTO TOWER, CORAL HEAD	20	GN - 7840
10	PHOTO TOWER, ANIYAANII	20	GN - 7662
11	CONTROL TOWER, PARRY	60	GN - 7694

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SUMMARY OF SUBMARINE CABLE
RECEIVED, EXPENDED, AND STORE

	<u>TYPE 104</u>	<u>TYPE 113</u>	<u>TYPE 114-P</u>	<u>TYPE 115-P</u>	<u>TOTAL</u>
RECEIVED	609,000	64,000	15,000*	840,000	1,528,000
EXPENDED					
Laid and in use	259,900	42,800	--	611,350	914,050
REPAIRS	10,500	10,320	--	9,000	29,820
WASTAGE, DEFECTIVE (cable trimmings, etc)	<u>35,320</u>	<u>800</u>	<u>--</u>	<u>750</u>	<u>36,870</u>
TOTAL EXPENDED	305,720	53,920	-0-	621,100	980,740
BALANCE TO BE STORED	303,280	10,080	15,000	218,900	547,260

* Erroneously shipped as Type 115-P.

LOCATION OF SURPLUS CABLE

	<u>TYPE 104</u>	<u>TYPE 113</u>	<u>TYPE 114-P</u>	<u>TYPE 115-P</u>	<u>TOTAL</u>
IN AEC WAREHOUSE, ENIWETOK	270,000	--	15,000	145,000	430,000
ON DEFECTIVE REEL, PARRY ISLAND	--	--	--	5,000	5,000
IN EVAPORATOR TANK, PARRY ISLAND (2nd tank north of dock)	29,500	--	--	--	29,500
COILED ON BEACH, PARRY ISLAND (LSM landing, south of dock)	--	--	--	65,000 2,080 1,620 200	68,900
COILED ON BEACH, PARRY ISLAND (north of coil above)	<u>3,780</u>	<u>9,500</u> <u>580</u>	<u>--</u>	<u>--</u>	<u>13,860</u>
TOTAL	303,280	10,080	15,000	218,900	547,260

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PHASE THREE: OPERATIONS FROM THE DEPARTURE OF SHIPS
FROM TERMINAL ISLAND TO INCLUDE ARRIVAL OF JTF HEAD-
QUARTERS AT ENIWETOK

(29 February WLD to 16 March ELD 1948)

1. On 29 February CTG 7.3 in MT. MCKINLEY, with BAIROKO, CURTISS, escorted by DUNCAN, departed Terminal Island. The first morning out, on 1 March, DUNCAN suffered an explosion believed to have been caused by a leaky acetylene bottle in the shipfitter shop. This caused extensive structural damage to the stern part of the ship, killed 1 man and seriously injured 6 others. CTG 7.3 directed DUNCAN return to Terminal Island and provided BAIROKO as escort. BAIROKO escorted DUNCAN to the San Nicolas Island where she was relieved by a tug from Terminal Island. On 1 March ALBEMARLE and ROGERS departed Terminal Island and proceeded to join the other vessels. At 031436Z, CNO directed that the two groups proceeding separately effect immediate rendezvous and proceed Pearl as one group and further directed Cincpacflt to augment escort from vessels present Pearl as soon as possible. MT. MCKINLEY and CURTISS turned back and on 3 March all units had effected rendezvous. TUCKER was designated as relief for DUNCAN and departed West Coast on 4 March. On 3 March Comdesron 1 in PARKS with Destroyer Division 11 (CRAIG, ORLECK, BRINKLEY BASS, and PARKS) were directed by Cincpacflt to depart Pearl immediately, join the movement unit and provide escort for the vessels into Pearl. Desdiv 11 effected rendezvous with the task unit on 5 March. Upon arrival at a radius of 500 miles from Pearl, ComFairWing Two provided

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air coverage for the ships until their entry into Pearl was completed. CTG 7.3 and the vessels of the task unit arrived Pearl on the morning of 7 March. CJTF 7 and staff immediately began the transfer of the JTF 7 staff and headquarters to MT. MCKINLEY. This was completed and the ships departed on 8 March for Eniwetok. Desdiv 11 was directed to remain under the operational control of CTG 7.3 and to accompany the ships to Eniwetok, providing escort en route. Accordingly, CTG 7.3 in MT. MCKINLEY, with CJTG 7 embarked, departed Pearl with ALBEMARLE, CURTISS, BAIROKO, ROGERS, PARKS, CRAIG, BRINKLEY BASS, AND ORLECK.

After departing from Pearl, the task unit proceed to Eniwetok along a track approximately 25 miles to the northward of the regular track and zigzagged during daylight and moonlight to minimize danger from a possible submarine attack. ComFairWing Two provided anti-submarine plane coverage utilizing two (2) planes where practicable and at least 1 plane at all times, for the entire passage from Pearl to Eniwetok. These ships arrived Eniwetok on 16 March ELD without incident.

2. a. Because of the special nature of the mission on which this group of vessels was engaged, the Commander Naval Task Group considered that normal peace time cruising readiness conditions would be inadequate. Hostile submarine surveillance, trailing, and attack without warning were a possibility which had to be approached realistically. Therefore, every precaution was initiated to insure:

- (1) That an efficient anti-submarine screen be maintained at all times, utilizing the 5 destroyers assigned,

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prepared to contact and report the presence of any hostile submarines, and to take prompt and effective retaliatory action, if required.

- (2) That all vessels take necessary action to comply strictly with prescribed conditions for damage control organization, watertight integrity, and surface (anti-submarine) lookout coverage.

b. The following readiness conditions were prescribed:

- (1) MT. MCKINLEY, CURTISS, ALBEMARLE, BAIRKO -
Condition 4 (paragraph 1120, USF-2) with engineering plant ready for 17 knots, split plant operation as desired; an adequate damage control watch to insure full compliance with the requirements for Condition B and to function efficiently and promptly in case of underwater damage from torpedoes or mines; and special emphasis on complete surface lookout coverage.
- (2) All destroyers - Condition 3 (paragraph 1117, USF-2) with engineering plant ready for 25 knots (Engineering Condition 33), but without split plant operation, an adequate damage control watch to insure full compliance with the requirements for Condition B and to function efficiently and

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promptly in case of underwater damage from torpedoes or mines; complete surface lookout coverage; one 5" mount and one 4mm mount manned; and complete ASW organization, including depth charge stations, manned.

c. Vessels of the screen conducted continuous sound search. All vessels were darkened during darkness. During daylight and on moonlight nights all vessels steered zigzag courses as prescribed by CTG 7.3.

3. On 3 March the GULL, SWALLOW, and PELICAN were sailed under escort to Kwajalein. After replenishment at Kwajalein these vessels were escorted to Station GULL at Mili, PELICAN at Ailinglapalap, and SWALLOW at Bikini. On 5 March QUICK and DAVISON reported for operational control and were sailed to Kwajalein. The aforementioned vessels were placed under the operational control of CTG 7.3 for special assignment in connection with operation Fitzwilliam, on a not-to-interfere with Sandstone basis.

4. Possible or probable submarine contacts by vessels and planes of the Off-shore Petrol were reported as follows:

- a. (1) At 1357 Mike on 20 February 1948, RABY (DE 698) reported a sound contact bearing 252°T, distance 26 miles from center of ENIWETOK Atoll. RABY maintained contact and at 1615 Mike reported the

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submarine to be bearing 284°T, distance 31 miles from the reference point. An estimated course of 045°T, speed 7 for the submarine was reported. A plane and PERKINS (DDR 877) proceeded to scene and PERKINS made contact at 1700 Mike. Both ships held contact, despite temporary lapses, until 1951 Mike when contact was lost and not regained. The search was continued until 0700 Mike, 21 February, by RABY, PERKINS, and one PBM with negative results.

- (2) Visibility was good and water clear, but no visual sighting of periscope or submerged submarine occurred at any time. RABY challenged by sonar without reply.
 - (3) Based on sound characteristics of: (a) good echoes; (b) characteristic recorder traces; (c) fairly consistent doppler effect; (d) propeller noise; and (e) loss of contact at ranges under 400 to 500 yards; it is considered that the target was a submarine at deep submergence.
 - (4) A plot of track showed various courses and low speeds with general movement about one knot towards the northwest.
 - (5) The evaluation of this contact is "PROBABLE."
- b. (1) At 1957 Mike on 22 February 1948, a sentry on PARRY ISLAND reported to CTG 7.2 that he had sighted a

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submarine on the surface at a distance of three (3) to ten (10) miles.

- (2) RABY (DE 698) was in radar range of the estimated position of the reported submarine but made no radar contact; RABY and one plane made a radar and sonar (by DE) sweep of the area all night with negative results.
 - (3) After an interview with the guard reporting the sighting it is considered doubtful that the reported sighting was a submarine; it is quite possible that the guard sighted RABY hull down on the horizon and mistook it for a submarine.
 - (4) The evaluation of the reported sighting is "DOUBTFUL."
- c. (1) At 2023 Mike 24 February 1948, RABY (DE 698) picked up a sound contact at a position 17 miles, bearing 097°T from the center of ENIWETOK Atoll. SPANGLER (DE 696) was dispatched to the position of the reported contact and picked up the contact at 2253 Mike and held the contact for 3 minutes. RABY held the contact until 0943 on 25 February, at which time the sound contact was lost.
- (2) Entire contact was by sonar; some propeller noises were heard. From characteristics of the sonar con-

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tact, it was considered that the contact was a deep submergence submarine.

(3) The evaluation of this contact is "PROBABLE."

- d. (1) At 1320 Mike on 3 March 1948, a FBM visually sighted submarine at position bearing 220°T, 20 miles from the center of atoll. When contact was made, submarine was 1 mile distance from plane; plane was at 1500 feet, submarine on course 270°T, speed 5 knots, and was running awash using snorkel; when sighted, submarine dived to keep submergence.
- (2) The pilot of the plane was later interviewed and stated that the plane, at 200 feet altitude, passed over the submarine and the pilot saw the snorkel and periscope above water and that the outline of the hull of the submarine and the water swirl and turbulence caused by the dive could be clearly seen.
- (3) Two surface vessels searched the area without picking up any sonar contact.
- (4) The evaluation of this contact is "ACTUAL SUBMARINE."
- e. (1) At 2101 Mike, 17 March 1948, LSM 250 reported a radar contact of about two minutes duration; bearing of contact was 090°T, distance 6 miles from DEEP ENTRANCE. ORLECK proceeded to scene, arriving about 40 minutes later, but was unable to pick up contact by radar or by sonar search.

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- (2) BRINKLEY BASS (DD 887) on patrol at WIDE ENTRANCE reported receiving a faint message at 22 Mike on 2232 Kcs; message was "Help, help, followed by something about submarine." A check of all TG 7.3 vessels indicated that none were in trouble; the origin of the message is still undetermined.
- (3) The evaluation of this contact is "DOUBTFUL."
- f. (1) At 1013 local time on 24 March 1948, a PBM on offshore patrol picked up a possible radar contact at twenty (20) miles range. The patrol plane closed the range until the radar "blip" disappeared at a range of one and one-half ($1\frac{1}{2}$) miles. The plane reported that the "blip" resembled a cloud echo on the radar scope, but that no clouds were present in the area.
- (2) At 1044 local time, the PBM again picked up the "blip" and retained "blip" on radar scope for two minutes; the position of the two contacts indicated a speed of 3.5 knots, course 200°T.
- (3) ROGERS (DDR 876) was directed by CTU 7.3.3 to conduct a sonar search in the area; the search was continued by ROGERS and PBM without result until

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0822 local time on 25 March, when the destroyer and plane resumed normal patrol operations.

- (4) The possible contact disappeared at a point 113°T, 29 miles from the center of the atoll (at approximately latitude 11°-18'N, longitude 162°-42'E).
- (5) The evaluation of this reported contact is "DOUBTFUL."

- g. (1) At 0157 local time on 25 March 1948, a PB-1W on patrol picked up a possible radar contact at latitude 11°-20'N, longitude 161°-40'E. The radar contact was evaluated as the "snorkel" of a submarine.
- (2) CTU 7.3.3 directed ROGERS to assist the plane in the search and ROGERS arrived on the scene of the reported contact at about 0300 local time. No further contacts were made by PB-1W or ROGERS.

- (3) The evaluation of this reported contact is "DOUBTFUL."

h. At 0729 local time on 29 March ROGERS reported a sonar contact bearing 147°T, 26 miles from the center of ENIWETOK atoll. Contact was held less than 1 minute. All further search was negative. Evaluation "DOUBTFUL."

i. At 301730 Mike March an ATC plane en route from Kwajalein to Guam reported that it had spotted three aircraft similar to C-47 planes, dark in color, on the northeast beach of Ujelang Atoll. Also, that there was a very thin long boat anchored offshore at the same

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place. A patrol PBY was dispatched to arrive at first light the next morning to investigate and to interrogate the natives. Investigation revealed that at the given location, a CB detachment, USN, was constructing buildings and that U.S.S. LCI 615 was serving as tender vessel to this force, anchored offshore. The frame construction apparently had given the impression of planes on the beach, and the LCI was the vessel reported. Evaluation: Own Forces reported.

j. On 7 April at 080355 Mike an ATC plane on routine flight observed an unidentified medium radar return bearing 288°T, distance 5 miles from WOTHO ISLAND. There was no visible movement. A patrol plane was dispatched to investigate but search was negative. Evaluation "DOUBTFUL."

- k. (1) On 9 April at 091336 Mike a C-47 plane on routine flight between Eniwetok and Kwajalein reported sighting a submarine bearing 130°T, distance 16 miles from Eniwetok. The plane was at an altitude of 3500 to 4500 feet at the time of the reported contact. Upon first sighting, the plane made a 360° turn above the contact and reported later that it appeared to be a submarine submerged, speed undetermined. The pilot's attention was attracted by the long white wake on smooth sea, heading 110°, on a straight course.
- (2) At the time of receipt of the report of contact a DE of the offshore patrol was patrolling very near

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PHASE FOUR: OPERATIONS FROM THE ARRIVAL OF JTF 7 HEAD-
QUARTERS AT ENIWETOK THROUGH
2 DAY PLUS 2 DAYS
(16 March 1948 - 17 May 1948)

1. Upon arrival of CTG 7.3 in MT. MCKINLEY with CJTF 7 and staff embarked at Eniwetok Atoll, ALBEMARLE anchored off Engebi Island and all other vessels were anchored off Eniwetok Island. The process of unloading AEC materials and other JTF special cargo was begun immediately, utilizing boat pool facilities and ships boats.

2. The Zero Island for the first test, ENGEBI, was 22 miles from the anchorage of the major vessels involved in the preparations for the test. Travel for individuals between the ships and Zero Island was slow and involved long trips for small boats. The liaison plane service was inadequate to handle all passengers and the LCI ferries proved to be too slow for many of the passengers. It was therefore decided to shift the berths of the MT. MCKINLEY, CURTISS, and BAIROKO to anchorages near ALBEMARLE off Engebi Island. On 21 March, these vessels shifted to the Engebi anchorage. To facilitate communications and to provide additional security, one destroyer was stationed at anchor, southeast of the vessels at Engebi, to provide ASW protection and to act as a communication relay vessel with the remainder of the task group vessels off Eniwetok.

3. With the arrival of Destroyer Division 11 plus ROGERS on 16 March, and TUCKER shortly thereafter, the offshore patrol was increased to 6 vessels on patrol at all times.

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4. On 20 March, 3 PB-1W planes of VX-4 detachment reported for duty and were assigned to night patrol using 1 plane on patrol each night. These planes were based at Kwajalein. The PB-1W planes are attached normally to an experimental squadron and these planes have very elaborate radar equipment installed; this radar equipment is capable of detecting a submarine, submerged, using snorkel. For this reason, it was considered best to use them on night patrols, when a submarine would normally feel quite secure operating on snorkel.

5. The preparations for the evacuation of the task group during the test were begun immediately after arrival at Eniwetok by conducting individual rehearsals of the components of the units involved. The two AVR, together with the small boats (wherries and LCVF) and DUKWs assigned to operate with the AVR, made several practice runs, tested communications, and practiced operations in conjunction with helicopter operations. Night operations were conducted using the special AVR channel lighted buoys. Beaching of sample recovery parties, retraction of boats, and delivery of samples to various units were stressed. Operations were repeated, simulating operating casualties, communications failures, SAR procedures, and indoctrination of the specially assigned personnel in radiological safety measures and in decontamination as well as general familiarization of the crews with the navigational aids and hazards to be encountered.

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6. It was necessary to provide adequate secure mooring facilities for the boats assigned to the boat pool which could not be hoisted aboard ships of the task group during evacuation. An extensive survey was conducted off Eniwetok and pontoons, mooring buoys and small boat anchorages were marked off to provide for the security of all boats.

7. On 17 March, CTG 7.3 investigated the feasibility of laying a Sono buoy barrier at the Deep Entrance and Wide Passage. Since such a plan was considered to be practical, BuShips was requested to provide the necessary equipment by air shipment. By 24 April, the buoys had been planted and two monitoring stations had been set up, with one being located on Parry Island and one on Eniwetok Island. These were manned continuously throughout the remainder of the operation.

8. On 8 April, a full dress rehearsal for all task groups was conducted. For the Naval Task Group a coordinated evacuation plan was placed in effect. This entailed departure of some units on minus 3 Day, including dispatching LST 219 to Ujelang on PETER X-RAY minus 3 Day. This vessel was thereafter stationed at Ujelang until after ZEBRA Day, in order to provide for the removal of the natives to safety if, by chance, that island were to become hazardous due to radiological fall-out or contamination from rain or winds. This was purely a precautionary measure.

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9. The evacuation of forces was based on the following basic steps summarized, briefly:

a. On test day minus 3 days.

- (1) Institute maximum offshore patrol of destroyers, destroyer escorts, and patrol planes.
- (2) Station evacuation vessel at Ujelang (PETER X-RAY Day only; vessel remaining at Ujelang thereafter).

b. On test day minus two day.

- (1) Helicopter detachment report to Commander Air Forces for operational control.
- (2) Navy Signal Unit embark in PASIG.
- (3) Dispatch AVR and small boats to special stations.
- (4) Place monitors aboard designated vessels.

c. On test day minus one day.

- (1) Conduct at 0600 Mike an accurate and complete muster of all units and ships.
- (2) Dispatch two planes to Kwajalein to stand by for SAR duties; all other planes conduct patrol, proceeding to emergency moorings at Ebeye (Kwajalein) to stand by.
- (3) Embark all shore based personnel in ships designated.

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- (4) Shift MT. MCKINLEY, CURTISS, ALBEMARLE and BAIROKO to berths off Parry (about 17 miles from Engebi).
 - (5) Evacuate all guards, special photographic details, and persons on specific assignment, to their stations.
 - (6) AVR conduct special operations for the firing personnel.
 - (7) Sail all vessels, except the four mentioned in item 4 above, out of the lagoon to areas assigned; SPANGLER enters lagoon late in afternoon and assumes duties as plane guard vessel for BAIROKO.
 - (8) Station reference vessels for drone control operations.
 - (9) Hoist aboard COMSTOCK or moor off Eniwetok all boats of the boat pool, and remove the crews.
 - (10) Complete final muster of all personnel.

d. On test day.

- (1) Prior to H hour transport via AVR the firing squad from Zero Island to Parry Island.
- (2) Provide vessels for emergency evacuation of all personnel ashore at Parry and Eniwetok; vessels are stationed about 2 miles south of Eniwetok.
- (3) Make observations of OCT of flash.

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10. The following basic steps were adhered to subsequent to H hour, as dictated by Re-Entry and by Radiological Safety Procedure:

a. On test day.

- (1) Immediately following test, AVR, carrying scientific recovery parties, monitors and crews for DUKW and LCVP assigned, proceeded at high speed to Zero Island and thereafter operated throughout the day as required to land parties, pick up personnel, deliver samples to ships, and to act as SAR for aircraft inside the lagoon.
- (2) Helicopters operated to transport sample recovery parties, to control the radio controlled tank, and to evacuate personnel and samples.
- (3) BAIROKO, preceded by radSAFE survey personnel in small boats, proceeds to anchorage off Zero Island. Thereafter BAIROKO is used as radSAFE check depot and decontamination station.
- (4) Boats are used to transport guards to unused Zero Islands, to take photo personnel to photo towers, to establish inner lagoon security patrol, to carry standby radio controlled tank to Zero Island and to determine the radiological conditions by sending monitors to survey the lagoon.

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- (5) All ships (except Offshore Patrol) are returned to anchorage within the lagoon.

b. Following test day.

- (1) When circumstances permit, return all patrol planes from Kwajalein to Eniwetok.
- (2) Reduce offshore patrol to a specified number less than maximum.
- (3) Assist TG 7.1 personnel in recovering samples as rad-safe conditions permit.

11. The above outlined procedure was carried out, or simulated, as appropriate, for the rehearsal on 8 April and all phases were executed successfully. On 15 April, test X-RAY was carried out, using the same procedure as on rehearsal day.

12. YOKE Day for the second test firing was designated as 30 April. It was again decided to leave the 4 major vessels (MT. MCKINLEY, CURTISS, ALBEMARLE, BAIROKO), plus the plane guard destroyer escort (SPANGLER), at the anchorages previously assigned off Parry Island (about 12.5 miles from Zero tower). The details of implementation were similar to those outlined for X-RAY Day test. Zero Island was AOMON-BIJIRI Island, and all ship movements, boat- ing, special channels for AVR and recovery parties, were shifted to AOMON-BIJIRI Island. On YOKE minus two day, weather predictions were not favorable and YOKE day was redesignated as 1 May 1948.

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The evacuation, test firing on 1 May, re-entry and all subsidiary operations were carried out smoothly and without incident.

13. On 1 May, a report was received from SWALLOW at Bikini, via a patrol plane commander and CTG 7.7, that foot prints had been found on the sand on ENIIRIKKU Island, and that NOL test equipment, used concurrently with operations being conducted, had been molested but not damaged. At the request of CJTF 7 to investigate further, RABY, with Captain T. BURROWES, USN, Colonel T. J. SANDS, GSC, USA, and a detachment of marines embarked, was dispatched to Bikini to make a complete investigation of the incident. After a careful reconnaissance and search of the islands and questioning of the personnel stationed there, it was concluded that there had been no intruders and that further physical sweep of all the islands would serve no useful purpose. RABY returned to Eniwetok on 3 May.

14. ZEBRA Day for the third test firing was designated as 15 May. It was again decided that the 4 major vessels and SPANGLER could be anchored safely off Parry Island at the anchorages previously assigned. This placed the vessels at a distance of approximately 9.6 miles from the tower on Zero Island (Runit Island). Again, all ship movements, boating, special channels for AVR and recovery parties, were shifted to the new Zero Island and the general plan of procedure, as used successfully on X-RAY and YOKE Days, was followed. Conditions of weather were favorable and ZEBRA test was

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carried out on schedule without incident. The evacuation, test firing, movement of special firing party, re-entry and special operations of recovery details were carried out smoothly.

15. In order to provide for complete, adequate, and efficient communications between the Task Force Headquarters at Eniwetok, Oahu, United States, and other points during the entire period of the operation, new and special equipment was installed in MT. MCKINLEY, CURTISS, ALBEMARLE, and to a lesser degree, in BAIROKO.

a. Special AN/TRC-1 equipment was installed in MT. MCKINLEY, CURTISS, and ALBEMARLE to provide for high speed Radio Teletype communications between these three major ships and also from the Flagship to the Joint Relay Station at Eniwetok. It is worthy of mention here that the Flagship acted as a relay station for all traffic originated by units afloat at Eniwetok. In this capacity as a relay center, she handled approximately 20,000 groups daily and a total of approximately 1,200,000 for the operation. Also installed in the same major ships were teletype machines which were used in conjunction with Crypto System SIGTOT. This system, being the most secure available, was used for the receipt and transmission of all AEC Restricted Data. This equipment also permitted conferences to be held between the three major ships and certain designated points in Oahu and the United States, thus eliminating the transmission of a great amount of classified information over normal channels. In addition to the

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SIGTOT system, one special ECM channel was provided for use between the three major ships and other major commands connected with this operation. This channel was in addition to the normal allowance of these commands and tended to reduce the load materially on normal Joint crypto systems.

b. To provide for inter telephone communication between the three major ships and all the islands of the Eniwetok Atoll special AN/TRC-1 gear was installed. These circuits were tied in with the ships telephone switchboard and provided facilities for the discussion of nonclassified matter in an expeditious manner between personnel located in the various large ships and on the principal islands. In addition to these telephones, Navy type MBF units were installed in the staterooms of the Commanders in the three major ships to provide intercommunication facilities.

c. Certain boats of the boat pool and those of the major ships were equipped with SCR 610 radio gear to insure positive control of the movement of boats within the lagoon. Due to the special mission the AVR's were to perform it was necessary to install the following listed additional equipment on each AVR: 1 TCS-13, 1 AN/ARC-1, and 4 SCR 300. This additional equipment insured positive communication with the AVR's at all critical times.

d. In all small ships and craft that were schedule to be evacuated from the lagoon, SCR 610's were installed so as to provide a voice tactical circuit for maneuvering.

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e. Approximately 225 radio men and strikers were made available by Cinopacflt to the four major ships to enable them to maintain efficient operation of all the equipment installed. Six Philco representatives were also furnished to provide technical aid and assistance, which proved to be of great value. Approximately 15 officers were furnished to CJTF 7 in MT. MCKINLEY to act as coding officers and CWO's. During the entire operation an approximate total of 20,000 messages were handled, of which approximately 60% were encrypted.

16. To provide for the security of information concerning movements of personnel and the conduct of operation SANDSTONE, all persons attached to Task Group 7.3 were required to execute a security pledge. Peter approval or Queen clearance was mandatory for all persons in the area after the limiting date of 1 February. Security clearance was granted to a total of 6881 Naval personnel plus approximately 400 attached to Fitzwilliam vessels. Vessels which were authorized to enter the Danger Area were required to impound all photographic equipment and supplies while in the Danger Area and for the short periods they were present at Eniwetok were not permitted any shore liberty. A program of talks and instruction periods was carried out to make TG 7.3 personnel security conscious. In addition, upon arrival of MT. MCKINLEY, CURTISS, ALBEMARLE and BAIROKO at Eniwetok, these ships established a security guard which was stationed topside on each ship; this guard consisted of 1 officer and 10 guards on watch at all times while at anchor.

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17. a. During the period of operation SANDSTONE, logistics were provided by Comservpac to JTF 7 units at Eniwetok through CTG 7.3, as follows:

- (1) Provisions: Chill, 790 short tons; Freeze, 354 short tons; and Dry, 835 short tons.
- (2) Fuel: Black 148,077 bbls (6,219,248 gals); Diesel, 37,770 bbls (1,586,340 gals); 115/145 low aromatic avgas, 458,101 gals; 115/145 high aromatic avgas, 119,490 gals; 80 octane avgas, 1,000 gals; 73 octane avgas, 35,000 gals; mogas, 500,066 gals.
- (3) Potable water: A total of 22,230,000 gallons of potable water was distilled for use of personnel, of which 7,578,000 gallons were distilled by PASIG and distributed by PASIG and YW 94 to units which were not self sustaining. PASIG arrived at Eniwetok with a full load of about 4,000,000 gallons water. During the operation 4,313,898 gallons of water were delivered to Kwajalein.

b. In addition to the foregoing, 33,742 measurement tons (14,591 long tons) of SANDSTONE material and equipment were transported to Eniwetok and about 23,000 measurement tons of SANDSTONE material and equipment were transported to Kwajalein by vessels assigned to the Naval Task Group. TG 7.3 vessels lifted 1006 passengers to Eniwetok and

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about 1700 passengers to Kwajalein, exclusive of JTF 7 personnel assigned to the vessels for billeting.

18. The Bureau of Yards and Docks, Navy Department, conducted certain tests of material and structures on Engebi (X-RAY Test) and Acomon (YOKE Test) Islands. Inspection of structures and gathering of data was completed by the BuDocks representative on Engebi on 24 April and on Acomon on 7 May. All data and information regarding these tests were forwarded to Washington by special courier on 8 May 1948. No BuDocks tests were planned for ZEBRA Day.

19. A movie exchange was established early in December in COMSTOCK to provide daily issue of film to all vessels present. This functioned at first only on sea prints which were turned in by individual vessels. In January, circuit prints were received from Comservpac at a rate of 5 new 16mm prints weekly. This exchange was open 12 hours a day, 7 days a week, to insure that operators would be able to draw film at any time. In addition to keeping all vessels supplied, and with the approval of the Bureau of Naval Personnel, Iscom Eniwetok was supplied film to supplement the Army motion picture service for Army units on the various islands.

20. Recreation facilities were set up on Eniwetok, Parry, Rujoru, and Runit Islands. These were, of necessity, meager and confined, because of the restrictions imposed by security of the islands and the limited time for granting liberty. In addition, the hazard of swimming in radiologically contaminated water restricted the use of these facilities. On each of the recreation

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areas portable reefers were installed to provide for storage of
beer, swimming beaches were marked off and channels and boat
facilities were developed to permit direct access by small craft.

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MONTHLY OPERATIONAL SUMMARY

MARCH
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CTG 7.3 in MT. MCKINLEY, with CJTF 7 embarked, with CURTISS, ALBEMARLE, BAIROKO escorted by DesDiv 11 plus ROGERS arrived ENIWETOK. ALBEMARLE anchored off ENGEBI, others anchored off ENIWETOK.

LST 219, escorting GULL, SWALLOW and PELICAN arrived KWAJALEIN.

17 QUICK and DAVISON departed PEARL for KWAJALEIN.

18 ComDesDiv 52 in TUCKER arrived ENIWETOK.

19 LST 611 departed ENIWETOK for PEARL with a full load of roll-up material.

FS 211 arrived ENIWETOK from resupply run to RONGERIK.

3 PB-1W planes arrived KWAJALEIN. Commenced 1 plane night search on 21 March.

20 PICKAWAY arrived PEARL.

PASIG departed ENIWETOK for KWAJALEIN towing YCV 17.

LST 219 Departed KWAJALEIN for ENIWETOK.

21 LST 219 arrived ENIWETOK.

22 PASIG arrived KWAJALEIN.

FS 211 departed ENIWETOK for KWAJALEIN.

Comcoortdiv One in GEORGE with CURRIER and MARSH departed PEARL.

23 PASIG and SWALLOW departed KWAJALEIN.

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MARCH

- 24 PASIG and SWALLOW arrived RONGERIK. QUICK and DAVISON arrived KWAJALEIN.
- 25 FS 211 arrived UJAE.
- 26 PASIG with SWALLOW departed RONGERIK.
- 27 PASIG and SWALLOW arrived BIKINI (SWALLOW to be based at BIKINI) PASIG departed BIKINI. FS 211 departed UJAE and arrived KWAJALEIN on 28.
- 28 PASIG arrived ENIWETOK.
- 29 WARRICK arrived ENIWETOK. FS 211 departed KWAJALEIN escorting GULL and PELICAN and arrived AILINGLAPALAP same day.

APRIL

- 1 PICKAWAY arrived ENIWETOK.
- USAT FS 211 and GULL departed JALUIT proceeding MAJURO.
- 2 USAT FS 211 and GULL arrived MAJURO.
- USAT FS 211 and GULL departed MAJURO proceeding MILI.
- LST 611 arrived SAND ISLAND HONOLULU for discharge of roll-up cargo.
- 3 USAT FS 211 and GULL arrived MILI. GULL remained as station vessel. FS 211 departed for KWAJALEIN same day.
- YANCEY departed KWAJALEIN for PEARL with roll-up load.
- 4 FS 211 arrived KWAJALEIN.
- 5 QUICK and DAVISON departed KWAJALEIN. QUICK to proceed to 12-40N 172-20E; DAVISON to 9-00N 172-05E.
- 6 QUICK and DAVISON arrived on station.
- FS 211 departed KWAJALEIN.

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APRIL

- 7 FS 211 arrived ENIWETOK.
- 9 YANCEY arrived PEARL.
- 10 LST 611 departed PEARL for ENIWETOK.
- MISPILLION arrived ENIWETOK to assume duties as station tanker.
- QUICK and DAVISON arrived ENIWETOK.
- FS 211 departed ENIWETOK to make reprovision trip to RONGERIK and BIKINI.
- 11 AREQUIPA arrived ENIWETOK to issue provisions.
- FS 211 arrived RONGERIK.
- 12 QUICK and DAVISON departed ENIWETOK for station.
- FS 211 departed RONGERIK.
- 13 QUICK and DAVISON arrived on station.
- FS 211 arrived BIKINI.
- 14 LSM 378 departed KWAJALEIN.
- 15 YANCEY departed PEARL for OAKLAND.
- FS 211 departed BIKINI.
- 16 LSM 378 arrived ENIWETOK.
- FS 211 arrived ENIWETOK.
- 18 QUICK and DAVISON arrived KWAJALEIN from patrol station.
- 19 QUICK and DAVISON departed KWAJALEIN to make resupply run; QUICK to MILI, arrived same day; DAVISON to ALLINGLAPALAP, arrived same day.
- 20 LSM 378 departed ENIWETOK for KWAJALEIN to pick up drummed 80 octane.

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APRIL

- 20 AREQUIPA departed ENIWETOK for PEARL
- 21 DAVISON arrived KWAJALEIN.
- 22 LSM 378 arrived KWAJALEIN.
- YANCEY arrived OAKLAND, for discharge of roll-up material.
- 23 LSM 378 departed KWAJALEIN.
- 24 LSM 378 arrived ENIWETOK.
- 26 LST 611 departed ENIWETOK for SAND ISLAND HONOLULU to discharge roll-up cargo.
- DAVISON departed KWAJALEIN for station.
- 27 QUICK departed KWAJALEIN for station.
- 30 YANCEY departed OAKLAND for PEARL.

MAY

- 1 LATONA departed KWAJALEIN, proceeded to ENIWETOK to re-provision vessels present
- 3 LATONA arrived ENIWETOK.
- CHEHALIS arrived ENIWETOK to deliver bulk mogas and drummed 73 octane avgas and drummed 72 octane avgas.
- LST 219 departed UJELANG for KWAJALEIN for logistic replenishment own ship and LCI 615.
- QUICK arrived KWAJALEIN from patrol.
- 4 MISPELLION departed ENIWETOK to load black oil to meet CTG 7.3 future requirements at ENIWETOK.
- 5 LST 219 arrived KWAJALEIN.
- 6 FS 211 departed to resupply detachment at RONGERIK.
- YANCEY arrived PEARL.

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MAY
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CHEHALIS departed ENIWETOK for PEARL.

DAVISON departed KWAJALEIN to reprovision and resupply
PELICAN at AILINGLAPALAP.

LST 219 departed KWAJALEIN for UJELANG.

LST 611 arrived SAND ISLAND for discharge of sandstone
roll-up cargo.

DAVISON arrived AILINGLAPALAP.

FS 211 arrived RONGERIK.

8 DAVISON departed AILINGLAPALAP.

QUICK arrived MILI.

FS 211 departed RONGERIK for BIKINI to reprovision and
resupply SWALLOW, arrived same day.

LST 219 arrived UJELANG.

MISPILLION arrived GUAM.

DAVISON arrived KWAJALEIN.

9 FS 211 departed BIKINI.

QUICK arrived KWAJALEIN.

MISPILLION departed GUAM for ENIWETOK.

WARRICK departed ENIWETOK for KWAJALEIN to begin loading,
roll-up cargo (TG 7.4 and 7.7).

10 FS 211 arrived ENIWETOK.

WARRICK arrived KWAJALEIN

12 QUICK and DAVISON departed KWAJALEIN for stations at sea.

LST 611 departed SAND ISLAND HONOLULU for ENIWETOK to pick
up roll-up cargo.

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MAY
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LATONA departed ENIWETOK and on departure reported to comservpac for op-control.

FS 211 departed ENIWETOK proceeded to MILI to roll-up, station there and escort GULL.

14 FS 211 arrived MILI.

15 FS 211 and GULL departed MILI enroute AILINGLAPALAP, to roll-up station and escort PELICAN.

QUICK departed station enroute KWAJALEIN.

DAVISON departed station enroute MAJURO to out phase balloon detachment. PASIG departed ENIWETOK enroute BIKINI to roll-up station and escort SWALLOW.

16 LST 219 departed UJELANG enroute KWAJALEIN.

FS 211 and GULL arrived AILINGLAPALAP.

QUICK arrived KWAJALEIN.

PASIG arrived BIKINI and departed same day for KWAJALEIN.

DAVISON arrived MAJURO.

FS 211 with GULL and PELICAN departed AILINGLAPALAP enroute KWAJALEIN.

17 PASIG and SWALLOW arrived KWAJALEIN.

FS 211 with GULL and PELICAN arrived KWAJALEIN.

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PHASE FIVE: ROLLUP

1. Among problems incident to Rollup are:

- a. Return of Navy owned property which was used for Operation SANDSTONE.
- b. Providing adequate shipping to return AEC, Army and Air Force cargo, in addition to Navy equipment which includes boat pool boats.
- c. Return of all passengers required to proceed via surface transportation.
- d. Return of all vessels of the Naval Task Group to designated ports in continental United States or Oahu.
- e. Release of all vessels and personnel to permanent assignments.

2. Disposition of Navy Owned Material

- a. All Navy consumable supplies, after screening by a Material Recovery Board, will be returned to Naval Supply Center, Pearl Harbor, T. H. for processing into stock, or other disposition as directed by the Supply Officer in command, NSC, Pearl Harbor.
- b. Material under cognizance of the Bureau of Yards and Docks will be returned to the Naval Advance Base Depot, Fort Huachuca, California, with the exception of that supplied from Oahu, which will be returned to Oahu; the latter does not include pontoons, which will remain at Eniwetok.
- c. Material under cognizance of the Bureau of Medicine and Surgery will be returned to the U. S. Medical Supply Depot,

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Oakland California.

d. Material under cognizance of the Bureau of Ships will be returned as follows:

- (1) Electronics and other equipment installed in ships will be removed by Long Beach Naval Shipyard in accordance with instructions issued by the Bureau of Ships.
- (2) Electronics equipment not installed in ships will be returned to the Electronics Officer, Long Beach Naval Shipyard, Long Beach, California.
- (3) BuShips special material furnished for Operation SANDSTONE will be turned in to assigned shipyards in accordance with detailed instructions from BuShips to cognizant Commanding Officers and to Naval Shipyards.

e. Material under cognizance of the Naval Ordnance Laboratory will be returned to Naval Ordnance Laboratory, Washington, D.C.

f. Material under cognizance of Naval Research Laboratory will be returned to Naval Research Laboratory, Washington, D. C.

g. Material under cognizance of the Bureau of Aeronautics will be returned as follows:

- (1) Photographic equipment and material, except motion picture cameras, to be shipped to Prospective Class 265, Naval Air Station, San Diego, California. All motion picture cameras will be

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returned to Naval Air Station, Anacostia,
Washington, D. C.

- (2) All helicopter spares RFI and Prospective
Class 265 helicopter material will be returned
to Supply Officer, Naval Air Station, San Diego,
California.

3. Shipments of material to destination indicated above will
be made only after screening by the Material Recovery Board,
ordered by Cinopacflt. No Navy owned equipment will be turned in
until determined by screening to be in fit condition for return
and for further use. Equipment determined to be unfit will be
abandoned, destroyed, or otherwise disposed of, in accordance
with current property disposal regulations and directives.

4. Shipping provisions for return of cargo

a. For the lift of cargo, 3 LST, 2 LSM, 2 AKA, 1 APA, 2 FS,
plus the space available on the other vessels of the Task Group
were available to CTG 7.3. In addition, minor loads were lifted out
by vessels under the temporary operational control of Commander
Task Group 7.3. There were 33,742 M/T (14,591 L/T) of cargo brought
out to Eniwetok and 23,000 M/T of cargo brought to Kwajalein. This
represents the cargo lift in a 8 LST trips (5 ships), 6 trips of
large cargo ships (5 ships), and 2 trips of small cargo ships
(2 ships), and two trips of a troop transport. In addition, 4 large
and 1 small reefer ships made a total of 7 trips, delivering 354 S/T
of freeze, 790 S/T chill, 835 S/T dry of dry stores to SANDSTONE units.

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b. Following ZEBRA day, there remained 24,000 M/T of cargo to be returned from Eniwetok to Oahu and the West Coast. Most of the AEC cargo is being carried in the MT. MCKINLEY, CURTISS, ALBEMARLE, BAIROKO, AND YANCEY; therefore these ships will return to Oakland for discharge at that port. There remained 6000 M/T of air force cargo at Kwajalein to be returned to the United States.

5. Shipping provisions for return of Boat Pool Boats.

The deck space of the vessels lifting out cargo, vehicles, and engineer equipment was at a premium and appeared to preclude lifting out all boat pool boats unless CONSTOCK made several trips. However, at a conference of representatives of all Task Groups, an allocation of space was made which made it possible to return all boats without excessive delay. To accomplish this, COMSTOCK will lift two LCT to Kwajalein and then return to Eniwetok for a complete load of boats; the departure of COMSTOCK from Eniwetok with the load of boats for Kwajalein will not occur until towards the end of roll-up, when the services of the LCT can be spared.

6. Shipping provisions for Weather Detachments.

Vessels were dispatched from ZEBRA Day stations to arrive at weather stations as soon as practicable after ZEBRA Day; these vessels lifted the weather detachments to Kwajalein for loading in WARRICK or PICKAWAY. In addition, PASIG, FS 211 and DAVISON were detailed to lift FITZWILLIAM units to Kwajalein; ROGERS picked up unit at Rongerik and joined the MOVEMENT UNIT enroute to Pearl. These FITZWILLIAM units are being returned to the United States in

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DAVISON, and in QUICK after transfer of Rongerik Unit from ROGERS at Pearl; some higher priority personnel and equipment are returning by air.

7. Release of vessels and personnel to permanent assignment

All vessels will be released to their respective permanent duty stations as soon as their services can be spared. The dates of release correspond roughly to the date of arrival at West Coast (Oahu). Personnel on Temporary Additional Duty, who are currently attached to vessels of TG 7.3, will be released at approximately the same time as their respective ships are released, and will be returned to their permanent duty stations, with delay in reporting to count as leave.

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CTG 7.3 SUMMATION

1. To summarize briefly the participation of the Naval Task Group (Task Group 7.3) in Operation SANDSTONE:

a. The Naval Task Group was constituted on 23 October 1947; the first group of vessels departed from Pearl Harbor on 15 November 1947 (West Longitude Date) and arrived at Eniwetok on 29 November 1947 (East Longitude Date). It is estimated that the last vessels of the Naval Task Group will depart Eniwetok on about 10 June, 1948, and arrive Pearl Harbor about 21 June, 1948.

b. Task Group 7.3 transported 33,742 measurement tons (14,591 long tons) of cargo and 1006 passengers from United States (or Oahu) bases to Eniwetok, and about 23,000 measurement tons of cargo and about 1700 passengers to Kwajalein; on completion of roll-up, TD 7.3 will have returned about 24,000 measurement tons of cargo from Eniwetok, and 6000 measurement tons from Kwajalein, and 2573 passengers from Eniwetok and Kwajalein to the United States, or Oahu. In order to accomplish this lift, 13 ships made 18 trips from the West Coast (or Oahu) to the forward area, and all ships made 15 trips from the forward area to the United States (or Oahu), on roll-up operations.

c. The Cable Unit (TU 7.3.6) laid, tested, and placed in use 914,050 feet of submarine cable.

d. During the period from 1 February, 1948, to 21 May 1948, the Off-Shore Patrol operated 12 ships (a maximum of 9 were assigned) to the patrol at any one time), with a total of 445

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ship-days on patrol, and 118,756 miles steamed on patrol; a total of 12 planes (a maximum of 9 were assigned to the patrol at any one time), flying a total of 223 patrols (1872 hours) in daylight searches, and 645 hours in night searches. Total flights for VP(MS)-6 were 302, totalling 2500 hours.

e. Six helicopters flew 826 flights, totalling 342.2 hours during the operation; a total of 1030 passengers were transported.

f. The Boat Pool maintained a total of 84 small boats, operating them for a total of about 78,500 miles.

g. The Joint Communication Center aboard MT. MCKINLEY handled a total of approximately 20,000 messages (60% of these were encrypted).

h. TG 7.3 distributed the following listed amounts of provisions to units of JTF 7 at Eniwetok and outlying stations: 790 short tons of chill, 354 short tons of freeze, and 835 short tons of dry; these were in addition to the provisions stored in TG 7.3 vessels on their departure for the forward area.

i. TG 7.3 vessels and unit consumed the following listed amounts of fuel: 148,077 barrels (6,219,248 gallons) of black oil; 37,770 barrels (1,586,340 gallons) of diesel oil; 458,101 gallons of 115/145 low aromatic avgas; 1500 gallons of 80 octane avgas. In addition, 119,400 gallons of 115/145 high aromatic avgas, 35,000 gallons of 73 octane avgas, and 500,066 gallons of mogas were supplied to other Task Groups of JTF 7 (345,000 gallons of mogas were expended during the operation). Two large tankers made three trips and three small tankers (AOG - gasoline and diesel only) made four trips to transport

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this fuel to the forward area.

j. TG 7.3 provided and distributed 22,230,000 gallons of potable water to JTF 7 units (including 4,313,898 gallons to Island Commander, Kwajalein).

k. A total of 7281 persons attached to TG 7.3 were granted "Q" clearances, or "P" approval, for operation SANDSTONE.

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OPERATIONAL REPORT
AIR FORCES, JOINT TASK FORCE SEVEN

Chapters 1 and 2 of this
report have been omitted
since they duplicate
information contained in
the main narrative report

Section VIII

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CHAPTER III

ORGANIZATION OF AIR FORCES FOR OPERATION SANDSTONE

1. COMMAND

To effect closer coordination between the operating units of the Task Force, one of the Deputy Commanders, Major General Kepner, was also named Commander, Air Forces. On 14 October 1947, as Commander, Air Forces, he was delegated¹ the responsibility for all air operations (except helicopters and those incident to off-shore patrol), military security within the Air Task Group, meteorological service, inter-island air transportation, air rescue, and aerial photographic service. He was made responsible for the operational planning of the Air Force units assigned him in accordance with directives of the Joint Task Force SEVEN Commander and requirements of the Scientific Director. About 15 March 1948, he was directed to establish a system of air traffic control in the Kwajalein-Eniwetok area. During the actual tests, he commanded and/or operated all aircraft, including helicopters, operating from Kwajalein and Eniwetok Atolls except Naval patrol aircraft.

2. MISSION OF AIR FORCES IN OPERATION SANDSTONE

The mission of the Commander, Air Forces, under Joint Task Force SEVEN, was:

- a. To cooperate with the Atomic Energy Commission in the conduct of tests required by that organization.
- b. To conduct such other air tests as desired by Armed Forces and approved by the Proof-Test Committee.

¹See Field Order No. 1, Hq, JTF-7

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c. To conduct all air operations necessary to the execution of Operation SANDSTONE.

3. OFFICE OF THE AIR COMMANDER ORGANIZED

An analysis of the function of the Air Forces in Operation SANDSTONE showed that two definite types of activity were necessary: First, that of staff operations in Headquarters, Joint Task Force SEVEN; and second, operations in the field, or the actual accomplishment of the mission. The Office of the Commander, Air Forces, was designated to perform the first of these two functions, and Task Group 7.4 was organized to accomplish the second. The problem of staff operations was complicated by the necessity for a close relationship between the Headquarters of the Task Force with the Commander, Air Forces, and with the many agencies that had to be dealt with in the Task Force as a whole, as well as coordination with other agencies outside of the Task Force supporting the operations.

In organizing the staff of the Air Commander, it was realized that the main function to be performed was the direction of air operations. The preparation of operational plans and orders to implement this direction required a diversified and well-balanced staff. An analysis of these requirements resulted in the formation of the Office of the Air Commander on 12 November 1947 with assignments as indicated on Chart 4. It should be noted here that all of the personnel assigned did not arrive on that date, and that a complete discussion of the assignments and arrival of personnel is contained in Annex "A", Part Two of this report.

A study of this chart will emphasize the fact that the Office of the Air Commander was one of operations, with sufficient personnel assigned to accomplish the administrative aspects of operations. In connection with

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the Naval Air Liaison shown on the chart, it must be emphasized that this liaison was effected continuously throughout the operation because of two factors: First, the fact that the Commander, Air Forces, was responsible, with the exceptions noted previously, for all air operation on test days, necessitated a close relationship with the Naval Air Units involved in the operation; second, the Combat Information Center aboard the USS MT. MCKINLEY was placed under his operational control for the duration of the air activities. This Combat Information Center provided a positive means of air control during the training period as well as during the actual operations. Problems faced by various officers of the staff are discussed in more detail in Chapter V.

In an operation of this type and with the organization used to accomplish the mission, there is always the danger of minimizing the part played by administrative personnel. Complete records of the procedure must be filed in an accepted manner, administrative action must be accomplished expeditiously, and action required and taken by the operating staff must be followed carefully if the over-all result is to be achieved. A complete discussion of the operation of the administrative section is contained in Annex "O", Part II of this report.

4. TASK GROUP 7.4

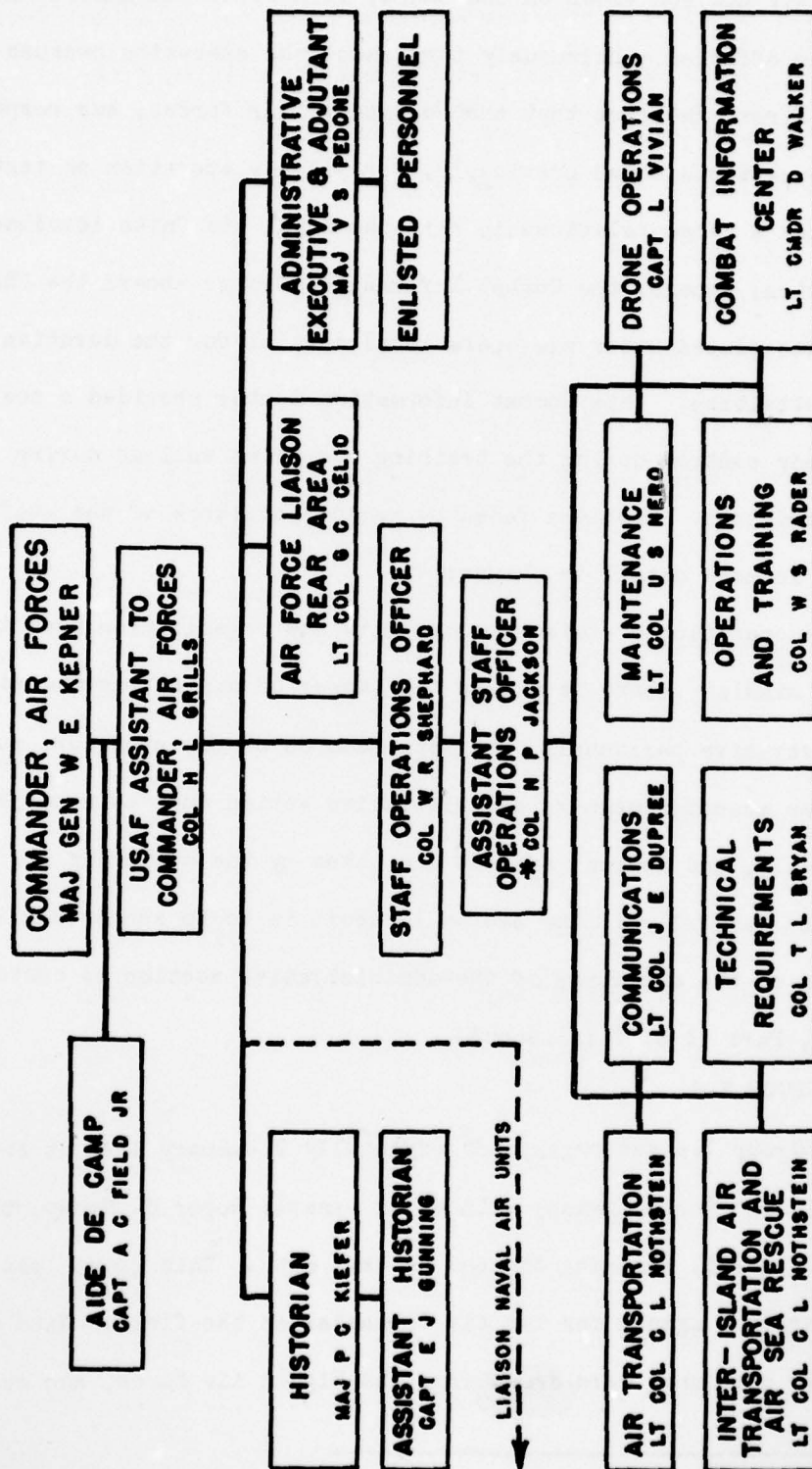
Task Group 7.4 was organized² officially 9 January 1948 at Fort Worth Air Field, Fort Worth, Texas, with Major General Roger M. Ramey, then Brigadier General, assuming command on that date. This group was to act as the operating agency for the Air Commander in the field. With a few exceptions, personnel were drawn from the Eighth Air Force, and much of

²Chart 5 on the next page shows the organization of TG 7.4

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ORGANIZATION OF STAFF COMMANDER, AIR FORCES, JTF-7



*COL N P JACKSON TRANSFERRED TO A RELATED PROJECT.
COL W S RADER ASSUMED DUTIES OF ASSISTANT STAFF OPERATIONS OFFICER ON 17 MARCH 1949.

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the organization and training was effected prior to the actual activation of the unit. Close liaison was established and continued throughout the whole operation between the Commander, Air Forces and Eighth Air Force through the Strategic Air Command. Task Group 7.4 was further subdivided as follows:

a. Task Unit 7.4.1 (Hq and Service Unit), commanded by Lt. Colonel Jack J. Catton, provided personnel and equipment for the Headquarters of Task Group 7.4, as well as third echelon supply and maintenance of all aircraft under command control of Task Group 7.4, and performed normal base housekeeping functions. An entirely new provisional unit was devised to meet the peculiar supply and maintenance requirements of the Task Group in this operation.

b. Task Unit 7.4.2 (Drone), commanded by Colonel John R. Kilgore, was established to operate twenty-four (24) specially equipped B-17 aircraft to meet the test requirement of air sampling. Eight (8) of these B-17's were "Mothers", designed to electronically control in the air an equal number of drone B-17's. Four (4) "Master Mothers" were provided to operate any drone as the need would arise. Four (4) drones were spares. In addition to securing air samples, four (4) of these drones were equipped to record blast acceleration within the area immediately surrounding the explosion. Most of the personnel for this Task Unit were drawn from the First Experimental Guided Missiles Group.

c. Task Unit 7.4.3 (Photo), commanded by Major C. T. Van Vliet, was designed to furnish air and ground photographic coverage of the tests, as well as documentary and historical photo coverage of Task Group 7.4

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operations. Most of the personnel for this Task Unit were selected from the 16th Photo Reconnaissance Squadron of the 55th Reconnaissance Group.

d. Task Unit 7.4.4 (Weather) was established to provide a complete weather service for Operation SANDSTONE. Ground weather detachments formed by the Continental Weather Wing and supervised by Major Louis A. Gazzaniga, located at Eniwetok, Rongerik, Majuro, and Wake were established in addition to a weather detachment located at Kwajalein to meet the requirements for ground observation. The air weather detachment consisting of eight (8) B-29's from the 514th Weather Reconnaissance Squadron, commanded by Major Paul Fackler, was also established at Kwajalein to meet the air observation requirements and to track the atomic cloud. The primary interest of Joint Task Force SEVEN in tracking the cloud and air currents carrying the radioactive residue remaining after the visible cloud dissipated, was stimulated by the necessity of insuring that no hazardous "fall out" of radioactive particles occurred overpopulated areas outside the vicinity of the test site.

e. Task Unit 7.4.5 (Air Rescue), organized by the Air Transport Command and commanded by Captain Banta M. York, was placed under the operational control of Task Group 7.4 to provide normal air rescue service in the operating area.

f. Task Unit 7.4.6, Army Airways Communications System, furnished by the Air Transport Command, was assigned, in addition to normal operating functions, the responsibility of relaying weather information to Headquarters Joint Task Force SEVEN. These AACS Units were located adjacent to the weather units to facilitate this.

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g. Task Unit 7.4.7 (Inter-Island Transportation), provided by the Air Transport Command, was placed under operational control of Task Group 7.4 to provide supply and re-supply service to the island groups involved.

h. Task Unit 7.4.8 (used only for movement purposes).

i. Task Unit 7.4.9 (Liaison), composed of personnel and liaison type aircraft obtained from Air Force, Army and Navy sources, was established on Eniwetok Island to provide air transportation between points in the Atoll which were otherwise accessible only by boat.

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CHAPTER IV

TEST REQUIREMENTS

1. TEST REQUIREMENTS UNDER THE SUPERVISION OF THE ATOMIC ENERGY COMMISSION

On 2 April 1947, the General Advisory Committee to the Atomic Energy Commission recommended that new atom weapons be developed to the point where tests could be conducted in early 1948. On 19 July 1947, President Truman approved the construction of a proving ground in the Pacific Ocean for routine experiments and tests of atomic weapons. The Atomic Energy Commission suggested a number of tests which they felt should be conducted, and the Army, Navy, and Air Forces were asked to submit their requirements for test purposes. Each of these services submitted a list of tests and, after screening this list, the Proof-Test Committee and the Test Director recommended eleven (11) service tests in addition to the tests to be conducted by the Atomic Energy Commission. Those tests conducted by the Atomic Energy Commission were of such a nature as to be classified as "Restricted Data" as defined by the Atomic Energy Act of 1946 and are not included in this history. All experimental observations in Operation SANDSTONE were carried out under the direction and supervision of the Atomic Energy Commission Test Director, Task Group 7.1.

2. GENERAL KEPNER SUBMITS AIR FORCE TEST REQUIREMENTS

In a memorandum to General Hull as Chairman of the Proof-Test Committee, General Kepner stated the Air Force requirements for atomic bomb proof-tests. He pointed out that many of the requirements of the

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Air Force had undoubtedly been included as a part of the Atomic Energy Commission's program, but he wished to indicate the field of interest of the United States Air Force. The following seven requirements were listed in this memorandum:

a. Blast Characteristics

Velocity and pressure gradients should be established to determine the full radius of probable damage. Further information should be obtained on characteristics at various levels above the surface. Blast accelerations should be recorded on drone aircraft at the time of detonation.

b. Height and rate of cloud ascent

Complete information should be obtained on the cloud development over a period of approximately fifteen minutes. Radioactivity measurements at appropriate intervals should be obtained at various heights by drone aircraft each equipped to take a series of air samples.

c. Incendiary data

A plot of heat intensities, velocity and duration of induced surface winds should be determined.

d. Radiation data

Data should be obtained on direct radiation over effective distances and on contamination due to rain-out. The pattern of surface contamination and the life of lethal radiation should be recorded.

e. Effects of precipitation

Information on this subject could possibly be attained during the tests.

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JOINT TASK FORCE SEVEN WASHINGTON DC
OPERATION SANDSTONE NUCLEAR EXPLOSIONS. ATOMIC WEAPONS TESTS. 0--ETC(U)
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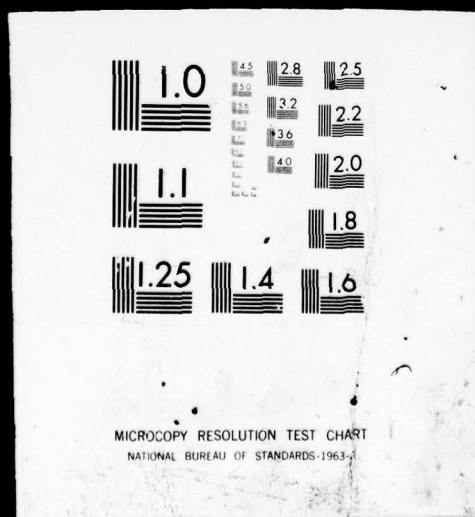


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f. Meteorological data

Meteorological data should be collected over a large area around Zero Point, both before and after detonation.

g. Decontamination

After each test, the Chemical Corps should determine all possible factors involved in decontamination of various surfaces such as earth, rock, and concrete, to obtain information on degree and endurance of contamination and to devise field methods for nullifying the effects of contamination in case an essential area must be utilized while radioactive beyond tolerance limits.

The Atomic Energy Commission Test Director commented upon the recommendations of General Kepner and stated that most of the Air Force requirements were either part of the Atomic Energy Commission program or that because of primary objectives of the test, certain of the data could not be obtained. He also stated that the Air Force would be called upon to assist the Atomic Energy Commission in obtaining much of the data requested by this memorandum.

3. ATOMIC ENERGY COMMISSION TEST DIRECTOR AND PROOF-TEST COMMITTEE RECOMMEND ELEVEN SERVICE TESTS

In addition to the experimental observations made by the Atomic Energy Commission, the following eleven service tests³, recommended by the Armed Services, and approved by the Test Director and the Joint Proof-Test Committee, were authorized:

³ A complete report on Air Force Test Requirements may be obtained through the Atomic Energy Commission by authorized personnel.

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<u>Service Test No.</u>	<u>Requested by</u>	<u>Description</u>	<u>Conducted by</u>	<u>Technical Control by</u>
a	Corps of Engrs, USA	Exposure of 2 reinforced concrete structures to determine structural damage.	CTG 7.2	CTG 7.1
b	Corps of Engrs, USA	Exposure of 2 reinforced concrete structures with- out collective protectors.	CTG 7.2	CTG 7.1
c	Corps of Engrs, USA	Exposure of an earth bar- ricade to determine shadow effect from blast.	CTG 7.2	CTG 7.1
d	BuDocks, USN	Exposure of 175 varied units for evaluation.	CTG 7.3	CTG 7.1
e	U. S. Air Force	Determination of blast acceleration by accelero- meters installed in air- craft.	Comdr Air Forces	CTG 7.1
f	Signal Corps, USA	Detection of the explosion by visual observation of the moon.	Comdr Air Forces	CTG 7.1
g	BuMed, USN	Exposure of small packets containing biological assay material	CTG 7.6	CTG 7.1
h	BuShips, USN	Exposure of small sample of materials with various coatings for purpose of establishing surface effects produced.	CTG 7.6	CTG 7.1
i	BuShips, USN	Field test and evaluation of several radiological instruments of new design.	CTG 7.4	CTG 7.1
j	BuShips, USN	Exposure small steel plate samples to obtain shielding data applicable to estimat- ing radiological effect of atomic bomb against any type of structure.	CTG 7.6	CTG 7.1
k	Chemical Corps	Exposure of one (1) Field Collective Protector E24R1 in each of two (2) concrete structures (Tests 1-3) on ENGEBI ISLAND.	CTG 7.6	CTG 7.1

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4. AIR FORCE TEST REQUIREMENT ON BLAST ACCELERATIONS APPROVED

The Chief of Staff, United States Air Force, was notified on 7 November 1947 that its requirement for test of blast accelerations to be recorded by means of recording accelerometers installed on each drone aircraft had been approved. The equipment to be furnished and installed by the Air Force in the United States. Colonel T. L. Bryan was designated Air Force Test Requirements Officer. He was made responsible for directing all United States Air Force technical tests, and for submitting the result of these tests, including all reports, photographs, movie films, data records, etc., to the Atomic Energy Commission Test Director, Task Group 7.1 as soon as possible after each test for review and clearance if further dissemination was contemplated.

In addition to the Air Force test requirement on blast acceleration, the Air Forces were required to assist the Atomic Energy Commission in the collection of air samples and the obtaining of meteorological data in the surrounding area.

5. TASK GROUP 7.4 OPERATED SPECIALLY EQUIPPED DRONE AIRCRAFT

In order to accomplish certain technical requirements, aircraft of Task Group 7.4 operated as follows:

a. For the primary purpose of collecting air samples for the Atomic Energy Commission, eight (8) drone aircraft were employed, four (4) north and four (4) south of the target point. Aircraft on the south side were located at altitudes of 14,000, 18,000, 22,000, and 26,000 feet, while those on the north side operated at altitudes of 16,000, 20,000, 24,000, and 28,000 feet. All drone aircraft were directed into the atomic cloud between five and ten minutes after the detonation, with each drone aircraft

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making three passes through the cloud.

b. For the secondary purpose of obtaining data on shock wave intensity, four (4) of the drone aircraft were equipped with special data recording devices as well as flight analyzer equipment. These four (4) drone aircraft were those stationed at 14,000, 20,000, 22,000, and 28,000 feet altitudes. On the first test, these aircraft were at least ten (10) miles out from zero point at the time of detonation. Location of the drone aircraft was determined as follows:

(1) Radar tracking of drone aircraft by S-band shipboard radar, with scope photographs taken in order to determine azimuth and range.

(2) For data on vertical displacement of all drone aircraft, movie film was taken of the radar altimeter scope reading aboard each drone versus barometric reading and time.

(3) Pictures were taken every three seconds from a vertically mounted K-17 camera in each drone aircraft as a possible aid in determining azimuth and range position.

(4) APS-10 scope cameras were installed in four (4) drones.

c. Aerial photographic coverage was accomplished by the photographic aircraft, Task Unit 7.4.3. Specially assigned personnel of 7.4.2, assisted by personnel of 7.4.3, also maintained and serviced all motion picture and K-17 cameras installed on DB-17 and MB-17 aircraft.

6. TECHNICAL PROCEDURES TO MEET TEST REQUIREMENTS

For the primary purpose of collecting air samples for the Atomic Energy Commission, air filters containing special filter paper were installed on the top and bottom of each drone aircraft. Servicing of these filters was accomplished by Atomic Energy Commission personnel, but Task

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Group 7.4 assisted the Atomic Energy Commission personnel in installing the filters on the aircraft prior to each mission. After landing the drones, all filters and their contents were removed from the aircraft and handled by Atomic Energy Commission personnel only.

For the secondary purpose of obtaining shock wave intensity, the following equipment was installed on drone aircraft:

- a. Flight analyzer equipment (all drones)
- b. Radar altimeter camera (all drones)
- c. Special recording equipment (four drones only)
- d. Vertical camera, K-17 (all drones)
- e. APS-10 scope camera (four drones only)

Information on the installation, servicing, and operation of all equipment used in drone aircraft is contained in Field Order Number One, Joint Task Force SEVEN. All data from this equipment was summarized and forwarded by Air Materiel Command personnel through Colonel T. L. Bryan to the Atomic Energy Commission Test Director, Task Group 7.1 for review and clearance. The removal of this data from the drones following tests was not allowed to interfere in any way with the primary requirement of removal of filters, and its removal by Air Materiel Command personnel was accomplished only in the presence of radiological safety personnel.

Requirements of the Task Force for assistance in predicting the path of airborne radioactive residue beyond the vicinity of the test area originated from a project outside the jurisdiction of the Task Force and is not considered a part of Air Force Test Requirements.

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CHAPTER V

PLANS AND TRAINING PRIOR TO TEST DAYS AT HEADQUARTERS

For the purpose of this report, the activities in the Office of the Commander, Air Forces, are divided into four phases which overlap each other to some extent. The first phase may be known as the Familiarization Period, or that period of time and study during which each officer acquired the background of knowledge necessary to him in the discharge of his responsibilities as a staff officer. The second phase can be called the Operational Planning Stage, or that period of time dedicated to operational area, the adjustment of conflicting staff interests, and finally the issuance of the orders for the operations on test days. The third phase can be called the Operational Phase, or the actual direction of the participating aircraft. The last phase is the "Roll Up" of the Operation.

This chapter will cover the first two phases of the activities described in the previous paragraph. Chapter VI will discuss similar problems faced by Task Group 7.4. Chapter VII will review the actual operations. Chapter VIII will present the roll-up plans and their accomplishment as they affect the Air Force participation in Operation SANDSTONE.

1. A PERIOD OF FAMILIARIZATION

a. Security

Prior to the assumption of any responsibility in Joint Task Force SEVEN, each officer reporting for duty at the Task Force Headquarters in Washington, D. C., was required to accomplish a lengthy form designated

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as WDAGO 643-A. On this form, he recorded multitudinous facts of his personal history; including his ancestry, places of domicile, schooling, types of employment, character references, and the like. This information was a necessary preliminary to a thorough-going examination of his background, his personal habits, and his associations by the Federal Bureau of Investigation. Not only his loyalty to the United States, but also his ability to safeguard classified information was to be closely scrutinized before he could be granted a "Q" clearance which qualified him to have access to "RESTRICTED DATA" as defined by the Atomic Energy Act of 1946. He was also required to sign a comprehensive security statement, which in itself was sufficient to make him aware of the importance of the responsibilities which awaited him.

Security was extremely important in this operation. Information of all kinds was so highly classified at the inception of the operation that many officers were unwilling to reveal even the smallest detail to the new arrival. This condition did have the desired effect of preserving security, but it was sometimes belabored to the point where work could not be accomplished. This was the situation that the new officer faced when he reported for duty.

A staff officer in Washington must find out who can get the problem solved. This business of knowing "who does it" can be complicated, especially when the work is classified "SECRET" or "TOP SECRET", and it becomes even more involved when the classification is "RESTRICTED DATA". In addition to the above difficulties, everything had to be hand-carried because the normal messenger service could not be used in handling this type of information.

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b. What is Restricted Data?

The Atomic Energy Act of 1946 defined Restricted Data as that information so classified by the Atomic Energy Commission. But what actually makes information Restricted Data? If one item of classified military data is added to another item of classified military data, does this final product justify a Restricted Data classification as defined by the Atomic Energy Act? At what point does information about SANDSTONE, as it becomes more comprehensive, become Restricted Data? These were questions that confronted officers assigned to this Task Force.

SANDSTONE was the first assignment with which the services were concerned that required "Q" clearances in any great number. The Federal Bureau of Investigation was flooded with requests for the complete investigations of personnel as required by this Act, and the time involved in obtaining these clearances caused them to set a normal period of sixty (60) days before a "Q" clearance would be issued. "P" approvals were granted to individuals who would not have to avail themselves of information classified as Restricted Data.

Because of the compulsion of time, officers assigned to SANDSTONE could not wait for the expiration of a sixty-day period before starting to work. In many instances each officer was concerned with the problem of deciding for himself whether or not information coming into his possession was Restricted Data. To be too free with information in conference with another officer was likely to lead to punitive action under the terms of the Atomic Energy Act of 1946. Thus, incidents developed in which one officer, not "Q" cleared, would refuse to discuss problems with another

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officer who was not "Q" cleared. Ridiculous, possibly, but this was certainly one of the early problems.

As this formative period was passed, personnel became accustomed to dealing with problems that were concerned with Restricted Data. More and more interpretations were given by those responsible for security, and finally a sane and realistic view of classification of material was developed. Close observance of security measures was enforced, but if an individual had a job to do and he needed certain information to perform this job, cooperation was generally obtained. This condition was not achieved, however, until most of the staff had received their "Q" clearances.

c. Background Reading.

A copy of the report of Operation CROSSROADS was secured from the Air Force Historical Section. This gave newly assigned officers a chance to read how similar problems had been solved before, but with this difference - security requirements were higher on SANDSTONE than they were on CROSSROADS. Problems of personnel and logistics were more difficult to solve in this new operation because the war was further behind us, and many highly trained personnel had been returned to civilian life. Logistical requirements were high, but the ability to handle supplies and material was low. Technical equipment desired was not available, aircraft were not equipped properly, and personnel trained to operate the aircraft and equipment had to be assembled. These and many other problems became evident as the staff of the Air Commander became familiar with Operation SANDSTONE.

Many responsibilities had been assigned the Air Force by the Proof-Test Committee. The staff became cognizant of these in their reading of the Joint Chiefs of Staff papers, Proof-Test Committee's reports, daily

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diaries, letters and various office memoranda. As each officer gained more information, he was able to talk more intelligently about these problems, other officers were less reluctant to brief him on how to get the work done. This may be a severe criticism of a system, but it points up the seemingly irreconcilable nature of the eternal conflict of interest between operational objectives and security restrictions.

d. Staff Conferences.

The Air Commander was aware of the situation new officers faced in getting information needed to do their work, so a daily staff conference was instituted for the Office of the Air Commander. Every afternoon at 1600, members of the staff assembled and reviewed the work of the day. Each officer was given the opportunity to tell what he had learned, and how his own work was progressing. This close association and exchange of information broadened the viewpoint of each officer.

Information that was brought to these meetings was gathered from many sources. In the daily contacts of staff members with other officers in Joint Task Force SEVEN, items of interest were assimilated, and when put together at the staff conferences with other relevant items, an integrated picture began to develop. The Air Commander attended many of these meetings and because of his broad knowledge of the whole project was able to provide the "missing links" that were necessary to have a complete understanding of the problem at hand.

The tri-weekly staff conferences at Headquarters, Joint Task Force SEVEN were attended by General Kepner in his capacity as Deputy. Colonel Grills (assistant to the Commander, Air Forces) and one or two other officers on the staff of the Air Commander also attended these conferences.

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Certain of the information gathered at these Joint Task Force SEVEN staff conferences could not be made available to all of the officers of the staff, but there was enough information disseminated to provide the staff with a reasonably adequate conception of the Air Force problems involved.

The Air Force members of the J-Staff and Special Staff of the Joint Task Force provided another vital source of information. Each major section of the Task Force had an Air Force representative whose function was to coordinate Air Force matters with the other services. Major General Barker, J-3, was very helpful in coordinating operations and training problems with Colonel Shephard, Staff Operations Officer for General Kepner. Colonel J. A. Morris, who was assigned to J-4, worked very closely with Lieutenant Colonel Nothstein, Air Transport Command Officer, and Lieutenant Colonel Nero, the Maintenance Officer. Colonel Patteson, Assistant J-2, assisted members of this staff with problems of security. Lieutenant Colonel Williams, Assistant J-1, was very helpful in solving many of our personnel problems. Major Crowson, Assistant Staff Weather Officer, worked very closely with members of this staff in the preparation of plans for the operation of aircraft on test days. General Cullen, Photographic Officer, advised the staff of the Air Commander on photographic problems. Other members of the Joint Task Force SEVEN Staff were equally helpful in providing information and cooperation for the accomplishment of the Air Force mission.

e. Field Trips.

As the staff officers became more familiar with the means of solving problems at Headquarters, they realized the necessity of becoming acquainted with activities in the field. Colonels Nelson P. Jackson and

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William S. Rader departed 19 November 1947 to visit the drone unit being assembled at Eglin Field, Florida. At various conferences held with Colonel Kilgore (Commanding Officer) and others of the 1st Experimental Guided Missiles Group, problems concerning organization, personnel, equipment and supplies, logistical requirements, movement, types of aircraft, and the characteristics of drone aircraft were discussed.

On 20 November 1947, these same officers visited Fort Worth Air Field and conferred with officers of the Eighth Air Force who were to be in charge of Task Group 7.4. Questions concerning personnel, strength, unit designation, tables of organization, military occupational specialties, movement, logistical requirements, station assignment, liaison officers, fuel requirements, control of drones, and weekly reports were discussed. Upon their return to Headquarters, Colonels Jackson and Rader submitted full and comprehensive reports to the Air Commander which were available for all members of the staff to study.

Colonel Herbert L. Grills departed Washington, D. C., on 3 December 1947 for a visit to Eglin Field and Fort Worth Air Field, at which time he briefed officers of the drone unit and Headquarters, Task Group 7.4, on procedures and policies to be followed by the units involved. In his report, he mentioned the security problems that were facing the drone unit. The training procedures set up for drone personnel were similar to those used in Operation CROSSROADS, and individuals who had been in the first operation were "putting two and two together", thus arriving at the conclusion that there would be another test of atomic weapons. Morale problems were discussed in connection with the need for

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the declassification of information. A report on operations to determine the amount of light available at various altitudes at the time the first light appeared at sea level was summarized. Reports of this kind became required reading for the officers in the Office of the Air Commander.

Staff visits, similar to the above, were made by other members of the staff at different times throughout the entire operation. A complete picture of the duties and responsibilities of a staff officer began to develop as information from these staff visits was assembled together with other data obtained from background reading, staff conferences, and day to day contacts with other officers in Headquarters, Joint Task Force SEVEN. The Office of the Air Commander was beginning to function as a staff.

2. OPERATIONAL PLANNING STAGE

The second phase of the work of the Office of the Air Commander was devoted to operational planning and direction. This phase began in November and December of 1947 when the various staff officers became familiar with their responsibilities and duties. The Air Commander pointed out that the first major task facing the members of his staff was the preparation of an operation plan for the Air Force activity in Joint Task Force SEVEN. Field Order No. 1³, Headquarters, Joint Task Force SEVEN, dated 14 November 1947, was received by the Office of the Air Commander on 19 November 1947 outlining the responsibilities of the various services. Annexes to this order were not distributed in their complete form until a much later date. It was realized that a complete operations plan could not be issued until problems involving personnel, aircraft, supplies, and equipment could be solved.

³ See Volume II

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a. Personnel Requirements.

The question of security clearance of personnel involved in the operation required a decision as to whether all participating individuals would have to have a "Q" clearance, or whether it would be possible to allow a certain number to have the shorter "P" approval. It was finally decided that individuals stationed at Kwajalein, who would not have access to Restricted Data, and whose duties would not cause them to be too closely associated with that type of information, could be cleared with a "P" approval. This decision saved many hours of work on the part of the Federal Bureau of Investigation and allowed them to process "Q" clearances with greater dispatch. In general, the following Air Force personnel required "Q" type clearances: The Air Commander's Staff, Task Group 7.4 Headquarters Staff, all photographic personnel, and the Commanding Officer and Operations Officer of Task Unit 7.4.2.

The Strategic Air Command had been directed 8 October 1947 by Headquarters, United States Air Force, to organize, man, equip and train an Air Force Task Group to be part of the Joint Task Force SEVEN. The Air Materiel Command, the Air Proving Ground Command, and the Air Transport Command had been ordered to support the Strategic Air Command in the operation. Thus, it may be said that the Eighth Air Force, which was the implementing agency of the Strategic Air Command for this operation, was the responsible organization in the procurement of personnel. There were several instances in which properly trained individuals were not available in any of the four main commands, and as a result Headquarters, United States Air Force, was drawn into the procurement procedure. Most instances of this type were handled by coordination between the Office of the Air

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Commander, J-1 of Joint Task Force SEVEN, and Air Force Headquarters. For the most part, however, General Kepner's staff was not involved in procurement of personnel other than for the staff itself.

b. Aircraft Requirements.

The problem of aircraft procurement varied from day to day until the requirement for aircraft was definitely established. During the planning phases of the operation, it was sometimes difficult to decide just how many and what type aircraft would be needed to perform the mission. For instance, the decision as to the number of C-54 type aircraft required for transportation purposes changed several times, with each change increasing the requirement previously established. In some instances, the availability of certain critical items of equipment influenced the problem. In each case there was quite a bit of discussion as to the need for aircraft, but discussion as to the type of aircraft to be employed was usually confined to the Office of the Air Commander.

Radio-controlled aircraft were needed on test days to penetrate the atomic cloud at 2,000 foot intervals from 14,000 feet to 28,000 feet. This requirement was met by the provision of twenty-four (24) B-17 aircraft, twelve (12) of which were radio-controlled, and twelve (12) were Mother aircraft. This provided fifty per cent spares to allow for technical and maintenance difficulties. These aircraft were equipped by the Air Materiel Command and turned over to the 1st Experimental Guided Missiles Group (Task Unit 7.4.2).

The 514th Weather Reconnaissance Squadron from Guam furnished the eight (8) specially equipped B-29 aircraft for air weather reconnaissance. Personnel in this squadron were already trained and equipped for

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the task, and the amount of special preparation for assignment to the mission was of a minor nature.

The photographic aircraft, two (2) F-13 and two (2) C-54 aircraft were furnished by Strategic Air Command from the 311th Photographic Reconnaissance Wing stationed at MacDill Field. The two (2) F-13 aircraft were specially modified so that they became, in effect, flying camera platforms equipped to obtain complete photographic coverage of the phenomena as it would appear from their stations.

A need for air transportation facilities within the limits of Eniwetok Atoll was established at an early date. Two (2) liaison type aircraft (L-4) had been brought to the test area by the 532d Engineer Boat and Shore Regiment as a part of its organizational equipment. Brigadier General Ogden, Commander, Task Group 7.2, was responsible for all construction in the test area, and when queried in January by Headquarters, Joint Task Force SEVEN regarding the utility of the L-4 aircraft, replied that he believed that this type of transportation should be sharply augmented in the Eniwetok area. His belief was based on the fact that an adequate amount of air transportation between the islands of the atoll would result in a great saving of time for scientific and construction personnel. For example, travel between Eniwetok Island and Engebi Island in surface craft consumed two and one-half ($2\frac{1}{2}$) hours, while the trip could be made in light aircraft in twenty (20) minutes. Consequently, five (5) of the liaison type aircraft (L-4 and L-5) were immediately procured from sources in Hawaii and shipped by water to Eniwetok. At the same time, arrangements were made to place six (6) L-5 aircraft aboard the USS BAIROKO (CVE-115) prior to the sailing date from Terminal Island, California, on

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1 March 1948. They thoroughly demonstrated their usefulness throughout the remainder of Operation SANDSTONE.

The need for air transportation between the remotely separated atolls was anticipated in the early planning stages of the Operation. The regular Air Transport Command service to Kwajalein provided satisfactory service from Oahu, but a special service from Kwajalein to Eniwetok had to be established. Other runs were needed to Majuro and other points in the area. Therefore, the Air Transport Command provided three (3) C-47 type aircraft, and one (1) C-54 for this inter-atoll service.

There was also a rapid courier service to the states and an evacuation mission that had to be provided for. The Air Transport Command furnished eleven (11) C-54 type aircraft for this need. Four (4) C-54 type aircraft would be in position at Eniwetok on test days prepared to fly to the United States with special samples. One (1) of the four (4) aircraft was to act as a spare. One (1) C-54 was needed at Kwajalein to transport spare drone control equipment from Kwajalein to Eniwetok to provide drone landing equipment at that point. One (1) C-54 was stationed at Kwajalein prepared to fly to Eniwetok and thence to the Zone of Interior with special photographic equipment. Four (4) C-54 aircraft were needed at Kwajalein to stand by for the possible emergency evacuation of personnel required to remain on Eniwetok Island on test days.

For Air Rescue service in the area, two (2) OA-10 type aircraft and two (2) B-17 type aircraft were needed. The OA-10's were amphibious type aircraft, and the B-17's were equipped with the Dumbo unit which could be dropped to the parties needing it in the water. In addition to these rescue provisions, the Navy furnished six (6) helicopter type

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aircraft, four (4) HO-35's and two (2) HTL's for special operations in the area. Two (2) Naval PEM's were also made available for air rescue as needed.

c. Maintenance and Supply Problems.

Lt. Colonel Ulysses S. Nero was assigned to the staff of the Air Commander to monitor supply and maintenance problems, and to keep him informed on matters of a logistical nature that might endanger the accomplishment of the mission. He had been A-4 of Task Group 1.5 (the Air Task Group) in Operation CROSSROADS, and was cognizant of the difficulties involved in the support of air operations of this type. He realized that the further an Air Force unit operates from the vicinity of supply and maintenance depots, the more complicated logistical matters become.

It was decided that normal Air Force supply procedures would be followed within the Zone of Interior in equipping the Air Force units before they left the states for the operating area. This decision entailed the requisition of logistical support for all aircraft in the area in sufficient time to allow water shipment to the operating area. Inasmuch as there were seventy (70) some aircraft of different types being assembled throughout the United States, Oahu, and Guam, it became quite a problem to coordinate all of this requisitioning. Most of the assembly of materiel was accomplished by the Eighth Air Force, but since other commands were also interested in the project, it was evident that some central agency would have to monitor the assembly of all of the air materiel for the project.

It was not the Air Commander's desire that his office become involved in the actual requisition of supporting items. His responsibility did extend over all Air Force matters within the Joint Task Force, but the

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actual procedures involved in procurement were the responsibility of Commander, Task Group 7.4, and all action taken toward supply and maintenance of Task Group 7.4 originated in that Task Group.

During the planning stages of this operation, the Maintenance Officer accompanied the Air Commander on two field trips to the operating area, and prepared comprehensive reports of these trips in which he pointed out the problems of supplying Air Force units in this area. In addition to presenting a clear picture of the supply and maintenance facilities available, many technical matters were brought to the attention of Task Group 7.4's planning staff that might have been overlooked and consequently have caused trouble later on during the operation. A quick survey of the reports submitted by the Maintenance Officer would suggest that he presented a pessimistic view of the possibilities that might arise, but in numerous instances this proved to be a correct interpretation of the situation. Aircraft from Task Group 7.4 were able to perform their mission successfully in the operation because the facilities and supplies necessary to maintain them were anticipated in sufficient time to make them available as needed. Airlift for aircraft supplies was held to a minimum so it could be used for the necessary movement of technical equipment.

The problem of sufficient equipment and supplies to maintain the various types of aircraft used in the project was one that could not be solved by simply ordering a "pack up kit" for each plane. Table II "pack up's" were not entirely satisfactory, because the aircraft used in this project had been modified to such an extent that many of the items in Table II were excess to the maintenance needs of Task Group 7.4. "Fly away kits" do supply most of the items of a smaller nature that would be

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very helpful in an operation such as SANDSTONE, but not enough of the heavier types of supply are included. It was therefore decided to modify and augment the Table II supplies with a carefully selected list of items to provide proper and adequate logistical support for aircraft in the operations.

d. Meteorological Plan.

During the initial stages of planning early in November 1947, the mission of the meteorological organization was stated in very general terms. Only three (3) B-29 aircraft were deemed to be necessary to furnish the data required, but it soon became evident that the weather requirements of Joint Task Force SEVEN would be very similar to those necessary for Operation CROSSROADS. To carry out the responsibilities of the Commander, Air Forces, as far as weather predictions were concerned, Task Unit 7.4.4 (Weather), was organized to provide weather information to Task Group 7.4, and in addition, to collect weather data and forward it to the staff Weather Section aboard the USS MT. McKINLEY for analysis, interpretation and dissemination. Colonel Benjamin G. Holzman had joined the staff of Joint Task Force SEVEN 20 October 1947 as Staff Meteorologist. He had served in this capacity at the first atomic bomb test near Los Alamos and later was the Staff Meteorologist on Operation CROSSROADS. To assist Colonel Holzman, Major Delmar Crowson, USAF, from the Atmospheric Section of Headquarters, United States Air Force, and formerly Officer-in-Charge of the Weather Central at Kwajalein during Operation CROSSROADS, was selected to act as Staff Meteorologist in the absence of Colonel Holzman.

In November, the only weather stations in the operational area were at Kwajalein and Wake. These stations were not equipped or manned

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to record and transmit the additional data which was required from these locations for such an operation as SANDSTONE. Therefore, these existing stations were augmented and additional island weather stations were added at Eniwetok, Rongerik and Majuro for the duration of the operation. Action was taken to send Air Force weather personnel and equipment to Wake to assist the United States Weather Bureau personnel stationed there. These island weather stations provided complete weather observations, including a minimum of four rawinsondes (radio and/or radar wind, temperature, and humidity soundings) per twenty-four (24) hour period. The island stations formed the basic part of a weather network, and Kwajalein and Eniwetok provided a forecast and briefing service for local commanders and transient aircraft as well as aircraft of Joint Task Force SEVEN. These island stations also provided a relaying service whereby all weather information, including flight reports and flight summaries, were gathered and forwarded for use by the staff.

The need for comprehensive weather data was so great that the original request for three (3) B-29 aircraft was increased to eight (8). These aircraft, furnished by the 514th Weather Reconnaissance Squadron, were based at Kwajalein. The Base Weather Officer of Task Group 7.4 furnished weather forecasts for operations and collected all data made available by reconnaissance and forwarded that data to the USS MT. McKINLEY.

The major ships of the Task Force were each equipped with complete aerological offices, but the services offered aboard the USS MT. McKINLEY were such that a major communications problem developed. Because it was necessary to collect and analyze several times the usual amount of data available to a ship's aerological office, a teletype intercept was installed in the aerological office, so that the continuous radio-teletype

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broadcast from the Weather Central at Guam by-passed the Communications Section aboard ship and was received in the aerological office where it was plotted immediately. The Navy Aerology Section arranged for two facsimile machines, technicians, and supplies and established a broadcast schedule especially suited to the needs of the Task Force. Two surface weather charts and four upper air charts were broadcast daily. Voice contact with aircraft flying over the operational area was established to aid in the detailed analysis of the daily weather.

e. Photographic Plan.

General Cullen, the Staff Photographic Officer, Joint Task Force SEVEN, received the first intimation that he would be in charge of photography on this operation when he met with Dr. Bradbury of the Atomic Energy Commission in August 1947, at which time an inquiry was made as to the best means of securing the photography desired.

A review of the requirements for photography by the Atomic Energy Commission, United States Army, United States Navy, and the United States Air Force revealed that there were four (4) distinct phases of photography involved: One, the technical photography required for the purpose of measurement; two, photography to record a definite action, equipment or area to illustrate technical reports; three, documentary photography required to portray the sequence of events and the manner in which they were accomplished; and four, identification photography for security purposes. This last-named photographic requirement was made the responsibility of J-2, Joint Task Force SEVEN, and the Staff Photographer had no connection whatever with this phase. The other three (3) phases of photography were obtained both from the air and from the ground. Motion picture or still

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photography in both black and white and color were the mediums used.

The establishment of the basic photographic requirements indicated a need for four (4) types of operating organizations in the test area: An aerial photographic unit, an organization to install cameras and allied timing equipment in the photographic tower, technical and documentary teams, and an emergency film processing laboratory.

The air unit organization was modeled after the Air Force Operation CROSSROADS with a similar camera installation. Two (2) C-54's and three (3) F-13 type aircraft were used. One (1) of the F-13's was set aside as an operational spare. The aircraft and their flying crews were supported by a small number of maintenance personnel.

A decision was made early in the planning stages of the operation that photographic towers would not be manned inasmuch as they would be located at an average distance of five (5) miles from each of the blasts. An organization was required to install, check and service all cameras and the necessary timers and allied equipment.

Seven (7) documentary photographic teams were organized as units capable of accomplishing every type of photographic service on the ground. Each crew was equipped with a professional type 35mm motion picture camera, a 35mm hand-held movie camera, a 16mm professional movie camera, a standard still camera of the press type and a large portable view camera.

A small laboratory equipped to process any type of negative and make prints of a size up to eight (8) by ten (10) inches was organized and equipped aboard the USS CURTISS. It was foreseeable that on many occasions technical groups would want the results of photography immediately after it was taken.

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Security of photographic products was a matter of concern from the inception of planning throughout the entire operation. It was early decided that the photographic organization would not be charged with the special security responsibilities, but that these would be controlled by the Security Officer, J-2, Joint Task Force SEVEN. An elaborate, and at times cumbersome, security program was laid out for the handling of all photographic products. This program was followed to the letter throughout the entire operation.

f. Communication Problems.

The problem of establishing communication facilities for the Air Force in Operation SANDSTONE was extremely complicated from a layman's viewpoint, but to an experienced communications officer it was little more than the normal requirement which might be established in a joint operation of this type. The Air Force Communications Officer was instructed to work closely with the Joint Task Force Communications staff in order to coordinate the planning and implementation of requirements for the Air Force. A complete list of the facilities was prepared, overlapping ones were eliminated, and each service was charged with the responsibility for procurement of equipment and supplies for its own needs. Difficulties encountered were brought to the attention of the Joint Task Force Communications Section, and through the joint use of facilities, interchange of personnel, materiel, and services, these problems were solved to the satisfaction of all concerned.

One problem that did cause considerable comment was the difficulty of establishing radio communication between the ships in the Eniwetok Lagoon and the shore facilities. This difficulty was believed to have been

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caused by the abnormal ionospheric characteristics prevalent during the period of the vernal equinox, and it was not until after 1 April 1948 that satisfactory communications were maintained by the use of predicted frequencies.

g. Air Transportation.

The Air Force and the Navy were given the responsibility for air transportation of personnel, supplies and equipment in the operation. The Air Transport Command (ATC) and the Naval Air Transport Service (NATS) were in turn designated by the above mentioned services to perform this mission. Both the Air Transport Command and Naval Air Transport Service had participated in Operation CROSSROADS and were in a position to make recommendations concerning the problem involved. After considerable discussion, it was agreed that no special unit should be established to handle the operation, but both of the services would absorb the additional load by augmenting their regular schedule. Naval Air Transport Service would move naval personnel and equipment involved in the operation and assist Air Transport Command should backlogs develop. The Air Transport Command, using its subcommand, the Air Transport Service (ATS), was to transport all other personnel and equipment. Under this policy, the Naval Air Transport Service then operated on a normal space available basis. Requests for monthly allocations of Air Transport Command airlift for the remainder of the operation were submitted each month to Headquarters, United States Air Force.

Airlift allocations requested up to and including the month of January were considerably under-subscribed because of excellent water shipping facilities available. However, during February, March, and April, the allocations were slightly over-shipped as a result of a large number of

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emergency requests for air shipment. In this connection, it should be mentioned that much of this last-minute emergency airlift was caused by lack of prior planning on the part of units of the Task Force. Much of the materiel should have been anticipated earlier and shipped by water.

During the period of actual testing, a large number of "VIP's" were transported to and from the areas as official observers. Several weeks before "Z" day, a comprehensive program was planned whereby six to eight hundred personnel could be moved quickly to the Zone of Interior by air at the close of the operation. The Task Force was able to "count noses" and establish a very definite schedule of movement in advance, and as a result, personnel movement to the United States by air was carried out as planned.

h. Operational Planning.

Field Order No. 1, dated 14 November 1947, Headquarters, Joint Task Force SEVEN, assigned certain responsibilities covering a wide variety of operations to the Commander, Air Forces. The staff of the Air Commander decided that these responsibilities, which were stated in general terms, could best be achieved by taking the following steps:

First, break down the responsibilities outlined in the Field Order into tasks to be performed by subordinate units of the Air Force and appropriate Naval Air Units.

Second, prepare an operations plan which would distribute the responsibilities to these units in a general manner, thus alerting them to their future duties and assignments.

Third, prepare a series of operations orders which would state in specific terms the duties each unit would be required to perform.

It was recognized that these three steps could not be followed

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progressively and without deviation. The factors of radiological safety, the problems of security, the variable requirements of the scientific staff, and uncertain meteorological conditions all tended to cause constant revision in the operations plan that was prepared. Whenever the staff felt that it had solved all the problems, and that the Operations Plan was completely satisfactory, a new problem was injected that caused considerable consternation for a while. After a time, each new requirement or change came to be looked upon as a matter of course, and if two or three days went by without any request for modification a feeling of uneasiness developed. In many instances, no actual change was required in plans or orders; a misunderstanding or misinterpretation had developed which could be clarified easily.

1. Operations Plan is Issued.

Colonel Willard R. Shephard, Operations Officer on the Air Commander's staff, was charged with the issuance of the Operations Plan No. 1-48 for the Commander, Air Forces. He was assisted in the preparation of this plan by Colonel Nelson P. Jackson and other officers on the staff. Colonel Jackson was transferred to an associated project on 1 March 1948, and his work as Assistant Operations Officer was carried on by Colonel Rader. As previously stated, their first objective was to break down the responsibilities of the Commander, Air Forces, into tasks for the subordinate units to perform, and then to assign these tasks to the units in a general way. The units themselves would have the responsibility of establishing the procedures to be followed in performing their missions.

Task Group 7.4 had already been organized and notified of its responsibilities in the Joint Task Force. The Commander, Air Forces, had

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recommended to General Ramey that Task Group 7.4 be subdivided into eight (8) subordinate units, and each of these units was alerted to its general responsibility. Personnel problems had been solved either by the Eighth Air Force or by the Strategic Air Command. The Air Materiel Command and other supply agencies were directing equipment and supplies either to the units themselves or to overseas destinations. Security matters were being solved by special procedures as outlined in the Security Report. The remaining problem of directing operations on practice and test days was the responsibility of the Office of the Air Commander.

Operations Plan No. 1-48 was issued by the Headquarters, Air Forces, Joint Task Force SEVEN, on 12 January 1948, at Washington, D. C. This plan followed the standard form, being divided into five main paragraphs covering the general situation, mission, tasks for subordinate units, administrative and logistic matters, and command and signal matters. In addition, there was a series of annexes amplifying the various responsibilities of the subordinate units. The purpose of this plan was to alert the units of the Task Force to their responsibilities on "P" (Practice), "X" (First Test), "Y" (Second Test), and "Z" (Third Test) days and to inform other units of the Task Force of the part that the Air Forces intended to play in the operation.

The issuance of this Operations Plan tended to crystallize the thinking of the Air Force Units involved and to bring forth comments from other staff members and the scientists. Procedures which had been thought to be acceptable to all needed modification and clarification. Other organizations of the Task Force issued Operations Plans, and it was found that there was occasional conflict in the thinking of the various groups involved. Problems arising from these discussions were solved by normal

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staff procedures and a final Operations Order for the first practice day was developed. It was hoped by members of the staff that this Operations Order would stand unchanged without amendment of any kind; however, this was too much to expect. New problems arose, and revisions of this order were made. Some of these problems are illustrated later on in this chapter.

j. Command Post Exercise No. 1.

On 26 November 1947, when the Office of the Air Commander was located in Washington, D. C., the Air Commander mentioned at a staff meeting the need for command post exercises aboard ship to familiarize personnel in this office with the need for prompt action on "X", "Y" and "Z" days. He realized that the facilities aboard the USS MT. McKINLEY were so integrated and so overlapping that it would take considerable training before all personnel would be able to take the proper and necessary action without stopping to think just how that action should be taken. Therefore, the Air Commander directed that all personnel in the Office of the Air Commander assist in the preparation of command post exercise messages to simulate all possible, and some seemingly impossible, situations that might arise on the test days. These messages were prepared and submitted to J-3 of the Task Force who had also recognized the need for training along these lines. Other units of the Task Force were asked to prepare messages for the command post exercise until it seemed that all possible situations had been covered.

On 2 March 1948, Joint Task Force Staff Memorandum No. 33 was issued, pointing out that one or more command post exercises would be held aboard the USS MT. McKINLEY while the ship was en route from Hawaii to Eniwetok. It stated that the purpose of the command post exercise was to familiarize communications and message center personnel of the USS MT. McKINLEY with the type of messages to be expected, their proper distribution,

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and priorities, the location of staff sections, and the message forms to be used. The command post exercise was designed to bring out problems which might arise during the actual tests and to illustrate the command or staff action required.

Time schedules were so arranged that the first day of the command post exercise (11 March 1948) telescoped the action of the three days immediately prior to "X" day into one day. Throughout this first day, numerous problems arose. Messages did not go to the right offices, no action was taken on certain messages, action was not reported to proper authorities, and many major and minor violations of good staff procedure were observed.

At the critique held by the Air Commander at the close of the first command post exercise day, it was pointed out that too many of the officers did not take the exercise seriously enough, and as a result, maximum benefit was not derived from it. General Kepner commented upon this point and stressed the fact that each officer and enlisted man was to be engaged in operations on command post exercise days just as he would on the actual test days. He emphasized that the Office of the Air Commander was primarily one of operations and not of administration. During the first few months, so much of the time had been taken up with administration and planning, that operations had, of necessity, taken a secondary position in the minds of all concerned.

The second day of the command post exercise was scheduled for 12 March 1948, the fifth day at sea. Possibly because of the fact that everyone had their "sea legs" by this time, the exercise progressed more satisfactorily. This day was to represent the actual "X" Day, the day of

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the first test. 0830, actual time, was to be command post exercise time 0200. Thus, by the time the command post exercise had started in the morning, many of the simulated drone aircraft were in the air and going toward their stations over the target. As the day progressed, "canned messages" were injected into the operation, each of which required action by various members of the staff. Every attempt was made to bring realism into the exercise. The staff never knew just what action might be required of them during the next few moments. A complete record of all simulated aircraft in the air was posted in the Air Operations Room. The Combat Information Center was in operation and cooperated throughout the problem by relaying information on location of all aircraft, and simulated the location of lost or stray drones. Air rescue planes were brought into the action to effect rescues at sea. As various phases were completed and the planes were directed to land, the final action of dispatching aircraft to the United States with test samples, was taken.

Difficulty developed on several occasions when "canned messages" were dispatched at the wrong time by the J-3 Division of the Task Force. Many of these messages had been written to deal with situations which might occur at some particular point in a sequence of closely related events, and their realism was lost when they were dispatched without regard for the factor of time. From this experience, it became obvious that such "canned messages" should be carefully identified with a logical time of dispatch.

At the critique following the exercise, it was pointed out that Air Force personnel were too verbose in their messages, that they would have to learn to say what they had to say in fewer words. There was a tendency to assign unjustifiably high priorities to many messages and

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their classification was inconsistent at times. In addition, it was felt that too much accuracy was expected on the part of radar in the location of the drones and other aircraft in the area. The importance of monitoring voice communications was stressed and finally the need for considerable practice with Task Group 7.4 was realized by all. This was to come later when all units of Task Unit 7.4.2 had arrived in the area and were ready to take their place in the operations. After the exercise, officers and enlisted men unanimously agreed that each had learned much of value about his role in the forthcoming tests. Each one looked forward to doing a better job next time.

k. When does it get light at Eniwetok?

Dr. Froman, Atomic Energy Commission Test Director, was interested in having the first test take place during the hours of darkness. Helicopters were needed to fly into the radioactive area almost immediately after the detonation to remove certain equipment, and drone aircraft were needed to make three (3) passes into the atomic cloud to collect air samples. Both of the above air operations required a certain amount of light to insure successful operation. This requirement of sufficient light was met by detonation of the weapon immediately before dawn.

The Air Commander had mentioned early in January 1948 at a staff meeting how much he had been impressed with the rapid change from darkness to light in this area. He suggested that the bomb could be fired a few minutes before dawn in the complete darkness on the island and within ten to fifteen minutes there would be enough light for the helicopters to enter the target area and find the equipment they were to bring out. This firing of the weapon immediately before dawn would also help the "beeper"

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pilots in the Mother B-17's direct their drone aircraft into the cloud, because at the altitude of approximately 20,000 feet it was light approximately ten (10) minutes before dawn at sea level.

The problem of determining this degree of light involved the operation of B-17 aircraft over the target area (and the USS MT. McKINLEY) on several different mornings. On 20 March 1948, Colonel Grills (Assistant to the Air Commander) received a message from General Kepner (who was in Guam at the time) requesting that Dr. Froman, Atomic Energy Commission Test Director, Lt. Commander Walker, Combat Information Center Director aboard the USS MT. McKINLEY, and Colonel Grills be tuned in to the frequency of General Kepner's plane on the morning of 22 March 1948. He also directed that Colonel Kilgore have one of his B-17 aircraft over the target area at the same time.

Thus, on this morning with the Test Director on the USS ALBEMARLE, the Commander, Air Forces, and the Commanding Officer of the drone units, both in the air, and Colonel Grills on the USS MT. McKINLEY, a part of the problem of timing the first shot was solved. Colonel Kilgore and General Kepner were able to relay information from the air as to the amount of light and the Test Director was able to check this information at sea level.

This flight also enabled the Air Commander to check the communications system from the air while there was still time to correct deficiencies if they should arise.

One of the most interested spectators at this early morning exercise was Lt. Colonel Dupree, the Air Forces Communications Officer. He had established the various channels of air communications, and now he was to see if his planning had been good. Colonel Kilgore, from

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Kwajalein, arrived over the ship and called the USS MT. McKINLEY about an hour before dawn. General Kepner called in a few minutes later and excellent radio contact between the two planes in the air and the two ships on the surface was established.

One development, which had been anticipated, was the failure of radar to identify different aircraft at an altitude of 14,000 feet when about two (2) miles apart. Only one "blip" showed up for the two aircraft. It was thus established that the usefulness of radar in plotting the position of several aircraft on test days was limited.

On subsequent mornings, aircraft were directed over the target until personnel aboard the USS MT. McKINLEY were able to coordinate their work much more effectively. The Combat Information Center personnel developed ways and means of exercising more effective control over the aircraft in the area. Other members of the staff were at their posts during these early morning exercises, and perfected their operations to a point where each officer was able to perform his duty without hesitation.

These exercises also gave the "beeper" pilots aboard "Mother aircraft" an opportunity to develop more accurate control over the drone aircraft under conditions which were expected on test days. Practice landing of drone aircraft on Eniwetok developed further proficiency on the part of the "beeper" pilots, and all aircraft personnel were given their first opportunity to take an active part in the early morning exercises. By the time "P" day had arrived, the process of getting up in the middle of the night, taking off to the target area, and getting on station for a simulated "shot" a few moments before dawn, became routine procedure.

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1. Can Eniwetok be used for Drone take-off?

After the issuance of Operations Order No. 2-48, one of the many suggested changes to the plan was the request that drone aircraft take off as well as land at Eniwetok. Two (2) factors prompted this request. One, the wear and tear on the automatic pilot used in the radio control of the drone aircraft seriously affected the weak point of the control system. This equipment was constantly worrying the "beeper" pilots who controlled the drone aircraft from the Mother aircraft. Any serious malfunction of the automatic pilot would cause immediate loss of control of the drone. The second problem concerned scientific personnel more than it concerned Task Group 7.4. Filter paper inserted in the drone aircraft for purpose of taking air samples as the drone passed through the atomic cloud had a distinct aversion to rain. Inasmuch as the drone aircraft were to take off from Kwajalein and travel at least two and one-half (2½) hours prior to reaching the target area, there was a distinct probability of the filters becoming wet and thus losing much of their efficiency prior to their entry of the atomic cloud itself. During the course of the early morning practices over the target area, several drones were flown to Eniwetok on the previous afternoon and landed there. They were taken off the next morning, and for several other mornings following that, with little or no trouble. The principal objection to drone take-off from Eniwetok was the fact that the island was so small that there was not sufficient room for the maintenance shops, quartering of the personnel and parking of the aircraft. Also, from a command standpoint, General Ramey desired that all elements of Task Group 7.4 be stationed on one island insofar as possible, thus enabling consolidation of facilities,

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but there was definitely not room on Eniwetok for all of Task Group 7.4.

Thus, the Air Commander was faced with the problem of deciding whether drone aircraft should take off from Eniwetok or Kwajalein. Favoring the take-off from Eniwetok were the factors of possible failure of the automatic pilot and the decrease in efficiency of the air filters. Favoring take-off from Kwajalein was the possibility of establishing major shop facilities for the aircraft as well as placing all of Task Group 7.4 in one general location. After favorable results were obtained in taking the drone aircraft off from Eniwetok on several mornings, Colonel Kilgore and General Ramey in conference with General Kepner, decided to fly eight (8) drones and four (4) Master Mothers to Eniwetok on test days minus one (1) day for take-off from that island. This necessitated the addition of forty-one (41) more maintenance personnel on an already crowded island, and increased the total personnel that might have to be evacuated if weather conditions should change and cause a possible "rain-out" from the atomic cloud after the explosion.

m. Briefing.

Early in the operational planning phases for SANDSTONE, it was recognized by both the Office of the Air Commander and Task Group 7.4 that there existed a definite need for a briefing on air operations. An extensive briefing procedure was established by Task Group 7.4 which included the construction of an air conditioned auditorium, a series of excellent charts, and an intricate method of lighting, as well as an exceptionally well planned summary of the operations. It was realized that Task Group 7.4 had the additional responsibility of briefing its own operating personnel for the accomplishment of their mission as well as the observers who were sent out to see the tests.

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Aboard the USS MT. McKINELY the staff of the Air Commander presented briefings not only to the interested personnel in Headquarters and Task Groups but also to the VIP's immediately prior to test days. A series of charts were prepared by the drafting section of the office of the Air Commander and each staff officer presented a synopsis of operations pertaining to his field. These included discussion on the following subjects: Introduction to Air Force briefing schedule, Air Transportation, Liaison Operations, Weather, Air Map Plan, Radio-Controlled Aircraft, Aerial Photographs Helicopter Operations, Communications, Combat Information Center and Technical Requirements.

Briefings were conducted in the Ward Room, and in each case a hundred or more officers and civilians were present. Other briefings, conducted by the Navy and the scientific personnel, were presented in much the same manner, and as a result, all personnel engaged in the operation were cognizant of the problems faced by others in the Task Force.

n. "P" Day Exercise.

Operations Order No. 2, Office of the Commander, Air Forces, Headquarters, Joint Task Force SEVEN, directed the air operations for the practice day operation preceding "X" Day. The purpose of this practice day exercise was to put into effect all operations that would be followed on "X" Day and to check the results. Task Group 7.4 had planned its procedure for "X" Day very carefully, but no organization can carry out a complicated air operation and expect it to proceed according to plan without practice. Although all units of the air task group had practiced individually, "P" Day was the first time a full scale rehearsal of "X" Day operations was attempted.

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All air operations scheduled for "X" Day were actually accomplished during this practice day. The drone aircraft were taken off manually from Kwajalein on the 7th of April and were landed at Eniwetok. Other aircraft departed Kwajalein as per schedule and arrived over the target area, performed their required missions and returned to their base. The drone aircraft were taken off electronically from Eniwetok by the ground control "beeper" pilots and turned over to the Mother aircraft in the air on the morning of "P" Day and directed to their positions over Engebi Island.

All drone operations were successful with two exceptions. One Mother had insufficient control to guide its drone through the center of the simulated cloud, and one Mother aborted and a Master Mother took over. Photographers in the photo planes had difficulty aiming their cameras at Zero Point, but this was not to be a problem on "X" Day because lighting arrangements would be different at that time. One weather ship aborted, but completed its mission before doing so. Cloud chasers and air rescue aircraft completed their mission successfully. Minor communication difficulties were discovered, but these were smoothed out before "X" Day.

Personnel in the office of the Commander, Air Forces, aboard the USS MT. McKINLEY manned their stations in accordance with their plan. The Combat Information Center was in operation from 0001 hours until the last aircraft had left the area. The Air Operations Room off the flag bridge was in contact with the Combat Information Center, with aircraft in the air, with the air strips at Eniwetok and Kwajalein. At the critique following "P" Day certain minor adjustments were suggested in the over-all operation, but the general result was considered to be very satisfactory.

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The most outstanding result of this practice day exercise was the successful take-off and landing of the drones at Eniwetok. Up until the time of this rehearsal, there had been some doubt about the success of this phase of operations, but after practice day it was established that it could be accomplished with entire satisfaction.

c. Operations Orders.

A series of Operations Orders were issued, each of which directed the operations for a certain period. For instance, Operations Order No. 2 stated the requirements for "P" Day prior to "X" Day and directed the subordinate units to execute their respective missions. Each subordinate unit in turn issued its own operations order which more specifically and more comprehensively outlined its part in the mission.

Each of the following orders was issued by the office of the Commander, Air Forces on the date and for the purpose indicated:

<u>OPERATIONS ORDER NO.</u>	<u>DATED</u>	<u>PURPOSE:</u> <u>To direct Air Operations</u>
1	17 Mar 1948	prior to "P" Day
2	31 Mar 1948	on "P" - "X" Day
3	12 Apr 1948	on "X" Day
4	21 Apr 1948	practice for "Y" Day
5	27 Apr 1948	on "Y" Day
6	7 May 1948	practice for "Z" Day
7	8 May 1948	on "Z" Day

Operations Orders No. 4 and 6 were fragmentary orders which directed limited operations for special purpose between test days. Each new order was necessitated by some change in the requirement for air operations. A copy of each of these orders may be found in Volume Two.

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CHAPTER VI

PLANS AND TRAINING PRIOR TO TEST DAYS IN THE FIELD

1. Mission of Task Group 7.4.

In order to accomplish the mission given him by Joint Task Force SEVEN, the Commander, Air Forces, assigned the following responsibilities to Task Group 7.4:

a. Provide, maintain and operate equipment to fly electronically controlled B-17 aircraft at altitudes between 14,000 and 28,000 feet for the purpose of making three penetrations into an atomic cloud.

b. Accomplish both aerial and ground photographic coverage of the operation as required by the Staff Photographic Officer of Joint Task Force SEVEN.

c. Provide, maintain and operate meteorological facilities in the forward area as required for air operations and the Joint Task Force SEVEN Staff Meteorologist.

d. Provide, maintain and operate communication facilities in the forward area as required for Air Force operations.

e. Maintain and operate a complete Air Force base at Kwajalein providing all services normally considered to be part of an air base operation, and in general, be prepared to operate any other air service that may be required for the success of the operation.

In analyzing the above requirements, it will be noted that a great deal of planning, preparation and training was necessary in the Zone of Interior. There was then the problem of moving the organization with all

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of its personnel and equipment to the forward area and establishing a main base at Kwajalein with smaller bases at strategic points in the area. Most of these requirements assigned to Task Group 7.4 are of a routine nature with the exception of operation of drone aircraft, photographic, and meteorological service.

2. Planning and preparation in the Zone of Interior.

The TWX from Headquarters, United States Air Force, containing the first official announcement of Operation SANDSTONE, arrived at Fort Worth Air Force Base 8 October 1947. This information copy stated that the Army, Navy and the Air Force would support the Atomic Energy Commission in the proof-testing of atomic weapons in the Western Pacific area during the early part of 1948. It directed the Commanding General, Strategic Air Command, to organize, man, equip and train a task group for later duty with a joint task force. The Commanding Generals of the Air Materiel Command, the Air Proving Ground Command, and the Air Transport Command were directed to provide appropriate assistance.

General Ramey flew to Washington for a conference with General George C. Kenney and General Kepner, and upon his return to Fort Worth announced to the key members of his staff on 10 October 1947 that he had been requested to submit immediately a "horseback estimate" of supplies and personnel needed for conducting a project utilizing thirty (30) aircraft for sixty (60) days.

Although certain definite information was lacking as to the scope of the operation at that time, the staff submitted new T/O and E's as required. A party of officers was sent to inspect the island of Kwajalein, where they found only a small amount of equipment and facilities remaining

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from CROSSROADS. They immediately returned for a conference with the Commander, Air Forces, on 20 October 1947, and were informed that the T/O and E's previously submitted had to be revised and final requisitions again submitted not later than 1 November 1947. Additional information was available for the project at this time including the fact that the 1st Experimental Guided Missiles Unit and a Photo Reconnaissance Unit had been designated as participants.

On 22 October 1947, General Kepner, General McMullen and General Ramey worked out a broad plan of operation to facilitate planning and to allow procurement and processing of supplies and personnel to proceed. This plan provided that: (1) a tentative Task Group chart should be drawn up; (2) a Chief of Staff be designated to coordinate the listing of supplies and equipment and to lay the general groundwork; (3) Commanding Officers of the subordinate units would be responsible for requisitioning equipment peculiar to their individual supply and maintenance problems; (4) Kwajalein would be rehabilitated by engineer effort from USARPAC; and (5) a total of twenty-six (26) aircraft plus air-sea rescue and Air Transport Command units would be ready for operation at Kwajalein at least two weeks prior to the first test. Other problems pertaining to logistics, personnel and operations were also discussed.

Key staff officers were chosen by name from bases in the Eighth Air Force jurisdiction and called to Fort Worth for duty only when needed to assist in the formative stage. After the preparational work had been accomplished, these staff officers returned to their regular assignments with the Eighth Air Force. In December, a formal briefing was held with all of the planning officers present, at which time they were instructed

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to make a final check of T/O and E's and submit final recommendations. The final organizational plan specified that Task Group 7.4 would be subdivided into eight subordinate units as indicated on Chart 5 in Chapter III.

Visits from members of the staff of the Office of the Air Commander and visits of the staff of Task Group 7.4 to the operating area added much to the information and planning that was necessary to organize, equip, man, and move to the forward area. Colonels Grills, Jackson, and Rader (these visits were reported previously in Chapter V), of the office of the Air Commander, visited the Task Group on different occasions and coordinated many matters that required attention at the time. It was stressed to the officers from Headquarters, Joint Task Force SEVEN, that the Task Group would go "by the book" insofar as possible, where clearances, supplies, and personnel were concerned. The Tables of Organization for all Task Units had been completed by 26 November and final method of travel for all personnel was submitted on that date. A directive was published covering procedures for Atomic Energy Commission clearances. Another directive covered the movement of unit aircraft from the United States to include staging, personnel processing, and equipment.

Lt. Colonel Jennings, Chief of Staff, Task Group 7.4, and Lt. Colonel Catton, Commanding Officer, Task Unit, 7.4.1, held a series of conferences on a trip to Kwajalein in December 1947. The first conference on movement through the port was held with the Chief of Staff, Fourth Air Force, and the Commanding Officer, Hamilton Field, on 9 December 1947. Arrangements were made at that time for housing space, headquarters space, messing facilities, and transportation for sixty (60) officers and eight hundred

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(800) enlisted men upon their arrival early in February. At Oahu the next day, they conferred with General Hull, Commander, Joint Task Force SEVEN (his G-3 and G-4) and Colonel Barney, Engineer Officer in charge of construction at Kwajalein. On 12 December, the party flew to Kwajalein and conferred with Captain Vest, USN, the Island Commander, and representatives of Air Transport Command, Joint Task Force SEVEN, and Corps of Engineers. Until this time, the Island Commander had only general information as to the needs of the Task Group. All points covering responsibilities of the Navy, Air Transport Command and Task Group 7.4 were covered in conferences with Captain Vest, who indicated grave concern over the ability of his contractors to meet commitment dates. A complete tour of the areas and buildings to be used by the Task Group was made, and agreement on construction or repairs was reached with the Engineers to cover minimum requirements. Upon the return of the party to Oahu on 14 December 1947, other conferences were held to smooth out the plans for construction and delineation of responsibility between the Island Commander, Kwajalein, and Commander, Task Group 7.4.

3. Training Problems.

All personnel assigned to Task Group 7.4 were selected carefully and considered to be thoroughly trained in their basic MOS. There were some minor exceptions to this rule, and as a result certain basic training had to be carried on by the units concerned. The greatest training problem of the Task Group was faced by Task Unit 7.4.2 because of the peculiar nature of its operation. Personnel to operate and maintain the complex electronics equipment that was used in the direction of drone aircraft required extensive training and practice from an individual standpoint before they could be

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advanced to crew training. There was a shortage of "beeper" pilots in the Air Force to accomplish the mission, and as a result some were called back to active duty while others were trained on the job for this work. In this training program it was discovered that an excellent airplane pilot did not necessarily make a proficient "beeper" pilot. As a result, a much larger number of personnel had to be selected for the training because of the relatively low number who would finally qualify.

In addition to the problem of training "beeper" pilots, there was also the serious problem of training communications and electronics maintenance personnel. Lack of proper equipment, space, and power supply limited the capabilities of the organization in its training work. In some cases, individuals were not assigned to the organization until it was almost ready to move to the operating area, and as a result some of the problems of training were carried over to Kwajalein.

The initial phases of unit training at Kwajalein consisted of testing the equipment, familiarizing the crews with the target area, and the preparation of navigational data for the impending operations. Continued operations of aircraft from about the 20th of March until "P" Day gave the operating personnel sufficient crew training to enable them to become very proficient, and operations on "P" Day confirmed the fact that Task Group 7.4 was ready for their operation on "X" Day.

The personnel selected to assist in the performance of the mission were generally of an extremely high calibre, and as a result the operational and maintenance problems were solved with little more than normal difficulty.

4. Movement to Forward Area.

There were several complicating factors involved in the assembly and

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movement of Task Group 7.4 to the operating area. Most of the prior planning for the movement had to be accomplished before the Task Group was officially organized. Personnel were drawn from widely scattered bases throughout the United States and the Pacific Ocean Areas. The Strategic Air Command, the Air Proving Ground Command, the Air Transport Command, and the Tactical Air Command were all involved in the movement, and in addition each of these commands designated subordinate units to accomplish the move. In a letter from Headquarters, United States Air Force, the Strategic Air Command was designated as the monitoring agency for these movements, and the responsibility was further delegated to the Eighth Air Force.

The movement order prepared by the Eighth Air Force provided for personnel to be processed for overseas movement prior to leaving their home stations in accordance with the current POM (Preparations for Overseas Movement) directives. Certain modifications were necessary in these directives to adapt them to the movement of a task force of this type, and for that reason a special POM was prepared late in November 1947. The aerial port of embarkation was designated as Hamilton Field, California, and the main body of Task Group 7.4, which was to be moved by air, departed prior to 12 February 1948. The ground echelon of the Task Group left the port at Oakland, California by ship on 10 February and arrived in Kwajalein 22 February 1948.

Because of the fact that certain technical equipment would not be available for the drone aircraft until late in February, a flight plan was set up to move the air echelon of Task Unit 7.4.2 in four (4) sections starting 10 March 1948, with the last echelon arriving at Kwajalein

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20 March 1948. The entire movement of Task Group 7.4 was accomplished without any great variation in the plan devised, but a few of the aircraft were delayed because of inclement weather and some difficulty in unloading cargo at Kwajalein was encountered. In less than two weeks at Kwajalein, over three and one-half million pounds of supplies and equipment were handled by the Task Group in unloading the three main supply vessels. Many problems which are normal for an operation of this kind were encountered, such as: Loss of stock record cards, no supply identification, and improperly marked boxes. Within a few days after all of this material was unloaded at Kwajalein, the work of rehabilitating the island had progressed to a point where a distinct improvement had been made in its appearance.

5. Drone Aircraft Requirement.

The first indication that the 1st Experimental Guided Missiles Group would be called upon to furnish a drone unit in an operation similar to CROSSROADS was received from General Richardson, Chief of the Guided Missiles Division, Headquarters, United States Air Force, in his letter of 14 July 1947, at which time he requested information as to the capabilities of this unit to train and make available either B-17 or B-29 aircraft for an operation of this type. A complete analysis of the two types of aircraft for drone operation was presented, with the conclusion that the B-29 aircraft would require approximately two years to develop the necessary engineering and techniques to give the same proficiency as was available with B-17 aircraft. On 15 August 1947, General Richardson held a conference with Colonel Kilgore at which ways and means of augmenting the 1st Experimental Guided Missiles Group were discussed. This first conference planned the operation of ten (10) drones and six (6) Mothers,

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but after various augmentations, this requirement was fixed finally on 8 December 1947 at twelve (12) Mothers and twelve (12) drones. In view of the increased number of aircraft and the critical shortage of control equipment, a need for experienced technical assistance was established, and action was initiated to obtain the services of three (3) civilians from the Air Materiel Command during the overseas operation.

6. Photographic Requirement.

General Ramey and General Cullen discussed overall photographic matters pertaining to the Task Force on 14 November 1947. The Joint Task Force SEVEN Photographic Officer was responsible for coordinating photographic matters among the various groups and units and providing plans for accomplishment of technical and documentary photography for the operation. He was further charged with the responsibility of monitoring the execution of these plans, personnel procurement, security coordination, and procurement of technical equipment and supplies.

The photographic plan entailed two distinct phases. First, documentary photography, consisting of a pictorial history of the project designed to include activities of the Atomic Energy Commission, the Air Force, the Army and the Navy. The second phase, technical photography, included ground and aerial coverage of the phenomena for the purpose of scientific measurements and other data. Facilities in the Zone of Interior were used for processing the bulk of the film, and a small photographic developing unit was established on one of the ships at Eniwetok for emergency work. The 16th Reconnaissance Group (VLR) Mapping implemented the photographic plan by forming Task Unit 7.4.3 to accomplish the mission.

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For security reasons, all exposed film was to be treated as "Restricted Data" as defined by the Atomic Energy Act of 1946, and strict measures were taken to see that cameras and unexposed film were securely stored, accounted for, and so handled as to prevent unauthorized use. The photographic teams were organized and equipped to obtain both technical and photographic coverage. Highest priority was given to the procurement of photographic supplies and equipment, much of which had to be purchased on the open market because it was not available in normal supply channels.

7. Meteorological Requirements.

After the selection of Eniwetok Atoll as the site for the future atomic bomb tests, the Staff Meteorologists, Joint Task Force SEVEN, made a survey of the available weather facilities in the Pacific Ocean Area. The survey indicated that only four (4) stations existed in sufficient proximity to Eniwetok to be of value in meeting the operational requirements of Joint Task Force SEVEN for meteorology. These stations were Kwajalein, Guam, Wake, and Johnston Islands. It became evident immediately that, in order to furnish an operational forecast service, new stations had to be established, and certain of the existing facilities had to be augmented.

Because safety problems are so dependent on wind information and the drone operations so dependent on cloud and rain information, new land stations located on the basis of strategic meteorological data and air weather reconnaissance were required. The new stations decided upon were Majuro, Rongerik and Eniwetok, and in addition the stations at Wake Island and Kwajalein were to be augmented.

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The Chief of the Air Weather Service was informed of the requirements above, and a decision was made to provide four (4) Weather Mobile Units to establish stations at Rongerik, Majuro, Eniwetok and augment the stations at Wake and Kwajalein. This additional personnel was organized, trained and equipped by the Continental Weather Wing at Tinker Field and was made available to the Task Force. The mission of these Mobile Weather Units was to supplement surface and upper air observations being provided by the established stations in the area. They departed from the Oakland, California, Port of Embarkation on 10 February 1948, arrived at Kwajalein 22 February 1948, where they were off-loaded and trans-shipped to their ultimate destinations.

With regard to aerial weather reconnaissance, the Chief of Air Weather Service directed that a detachment of the 514th Weather Reconnaissance Squadron at Guam be made available with eight (8) specially modified B-29 type aircraft to satisfy this requirement. The mission of the Air Weather Reconnaissance Unit was to make and record observations over extensive areas using specialized instruments and techniques. They departed their home station at Guam and arrived at Kwajalein 10 March 1948 to begin their operation.

8. Miscellaneous Requirements.

Air Rescue Service was provided by two (2) (ER) B-17's and two (2) OA-10's aircraft from the Fifth Air Rescue Squadron, MacDill Air Force Base, organized as Task Unit 7.4.5.

The Commander, Task Group 7.7, in his other capacity as ISCOM (Island Commander, Kwajalein for CINPAC (Commander-in-Chief, Pacific)), had been operating an Air Rescue Service for the Marshall Islands area. By a mutual agreement between Commander, Task Group 7.4 and Commander, Task Group 7.7,

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the additional aircraft mentioned above were turned over to Commander, Task Group 7.7 for operational control to augment the existing Air Rescue Service except on actual test days. Special training for the project was confined almost entirely to cruise control and instrument calibration. During the course of the operation, there were fortunately no occasions for use of this unit, although its mere presence gave confidence to personnel flying in the area.

Communication services and navigational aids for Operation SANDSTONE were furnished by detachments of Task Unit 7.4.6. The Kwajalein detachment was heavily staffed and equipped to act as a central station for the purpose of transmitting weather information and communications service. This unit had been in place prior to the requirement for this operation, but additional personnel were assigned because of the heavier load. Other personnel were furnished by the Air Transport Command as needed.

The Air Transport Command had agreed in October to furnish four (4) C-47 type aircraft for a shuttle service between Kwajalein and other points in the test area. Two (2) of these aircraft were already in the area and were put into use immediately. In February, difficulty was encountered in obtaining spare parts for the C-47 aircraft and a C-54 was added to the inter-island shuttle service on 7 March 1948. The regular schedule was augmented by the use of this C-54, and as a result facilities for trans-shipment of personnel and material from Kwajalein to Eniwetok were entirely satisfactory throughout the operation.

The requirement for inter-island transportation within Eniwetok Atoll was satisfied by the establishment of Task Unit 7.4.9. Scientific and military personnel traveling from one island to the other were handicapped

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by loss of time when they traveled by boat. For instance, the time for the trip from Engebi to Eniwetok was two hours and a half by boat, but only twenty minutes by liaison aircraft. General Ogden had recommended, when queried by Headquarters, Joint Task Force SEVEN, that liaison aircraft would be highly desirable for inter-island transportation, and as a result a total of thirteen (13) L-4 and L-5 type aircraft were placed on Eniwetok for that purpose. This unit proved its value in a short time after its arrival, and by 17 March 1948 had established a complete "air taxi" service within the atoll. The daily passenger load averaged about fifty, with peak loads of ninety or more per day, and in addition to normal air traffic there were several instances of emergency movements of personnel for medical purposes.

9. Morale.

The establishment of the Air Force Base at Kwajalein involved the normal difficulties encountered in an air operation of that kind, but the island of Kwajalein became "home" for about fifteen hundred (1500) Air Force troops for a period of approximately four months. It was there that they ate, slept, trained, and staged the air activities of Operation SANDSTONE. There was as much activity after midnight as there was during the day, because requirements for aircraft were such that very early morning take-offs were required. This was normal for many of the troops, because they had been in England during the war and had learned that there are no hours of the day when everyone sleeps.

Morale was high on the island, but this was not an accident. Everything that could be done for the welfare of the troops was planned for and accomplished. They lived in tents with cement floors. Their latrines were

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clean and neat. The area was policed daily. Fire buckets were in place, mess halls were almost spotless. The mess officer conducted a superior mess. Officers and enlisted men were proud of their part in the operation. The latrine orderly was pleased on Saturday morning when the inspecting officer commented upon his diligent work in keeping the toilet bowls clean. The cooks were glad to have their kitchen inspected and were quite upset if any unfavorable report was submitted. The recreation area was planned for the convenience of all. Special Services provided equipment for almost any type of recreation. Picture shows were relatively new and free. There were at least three shows that were different each night on the island. Officers' clubs were not elaborate, but all normal facilities were available. Ice cream was served at least twice a day, and seconds and even thirds were available. Chicken, turkey and steak were not uncommon at meal time. The officers and men were proud to say that they were part of Task Group 7.4. They were proud of their tan, and some were treated at the dispensaries because they did not have enough respect for the tropical sun. The laundry did not leave the best creases in the uniforms, but clothing was clean when it was returned. There was a shortage of fresh water, but always a sufficient quantity for drinking and keeping clean. Cigarettes were seven cents a pack with no rationing. Cold drinks were available and consumed in tremendous amounts. Mail service was good, and cable service was maintained. When personnel who were stationed at Kwajalein look back on their experiences during Operation SANDSTONE, they will have much that is good to remember in spite of that inevitable longing for their real home back in the States.

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CHAPTER VII

AIR OPERATIONS ON TEST DAYS

2. "X" DAY OPERATIONS

H-hour for the first atomic weapon test conducted by Joint Task Force SEVEN was set at 0617 hours on 15 April 1948. At the weather briefing on 12 April, the forecast weather was considered satisfactory for the requirements of the scientists, the air operations, radiological safety and other operating agencies. There was the possibility of precipitation causing a heavy "rain out" of radioactive particles from the atomic cloud, but the winds were such that the path of the cloud would not cross inhabited areas. At the subsequent weather briefings no major change was predicted and at the final briefing at 0445, 15 April, the final decision to go ahead with the test was given by General Hull.

The "practice day" operation on 8 April had revealed no major difficulties as far as air operations were concerned. Drone aircraft had been landed at Eniwetok the day before and were satisfactorily taken off from there during the early morning hours of "P" day. All aircraft had successfully completed their simulated missions for "X" day and had returned to their bases without major difficulty.

By 14 April, all aircraft had been thoroughly checked and everything was in a state of readiness for the next day's mission. The drone aircraft were manually flown from their base at Kwajalein on 14 April and

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were given their final electronics air check-out by their respective Mother aircraft while enroute. One drone had been forced to return to Kwajalein for minor maintenance and was later flown to Eniwetok. The radio-controlled aircraft were taken off from there the next morning by the "beeper pilots" on the ground and were directed by their respective Mother aircraft to their stations over Engebi Island. Other aircraft were flown from Kwajalein to their assigned locations and by 0550 hours, approximately thirty minutes before H-hour, all aircraft had reported on station.

The Commander, Air Forces, and his Staff aboard the USS MT. MCKINLEY had manned their stations and were prepared to direct the air participation in this first test. Operations Order No. 3, issued by the Office of the Commander, Air Forces, Headquarters, Joint Task Force SEVEN, had directed the scope of the entire air operations. The Air Operations Room, just off the Flag Bridge, had plotted the position of all aircraft, and facilities were available through the Combat Information Center to communicate with all aircraft in the area, all ships in the fleet, Kwajalein, and Eniwetok.

Chart 7 on the next page contains the information that was plotted on the "OPS" board in the Air Operations Room by the Staff of the Air Commander. When the data from this chart is used in interpreting the information contained on Chart 8 showing the planned positions of all aircraft in the air, a complete picture is obtained of air operations

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on "X" day.

When studying these two charts it must be borne in mind that there are five distinct missions being performed by the aircraft. The mission of collecting air samples from the atomic cloud, plus the collection of blast data, is accomplished by the drone aircraft. Aerial photography for scientific and documentary coverage is performed by the photographic aircraft. The mission of collecting meteorological data and tracking the atomic cloud is performed by the weather aircraft. The collection of certain scientific data after the blast is accomplished by the helicopters. Air Rescue Service is provided by both Army and Navy Aircraft.

During the operations on "X" day, all air operations proceeded on schedule with three exceptions. The pilot of Imitation Two, a weather aircraft, noticed a sudden drop in the oil pressure on No. 4 engine which prompted him to decide to feather the propeller. However, before this feathering could be accomplished, the propeller ran away, the engine froze, but the propeller "windmilled". Excessive vibration occurred, and the generation of extreme heat was evidenced by the white hot appearance of the nose section of the engine. Finally the propeller fell free and visual evidence of heat disappeared.

With the danger of fire no longer existent and control of the aircraft assured, General Kepner then directed the aircraft to return to Kwajalein.

The second exception to the planned operations was the loss of the drone aircraft operating at 14,000 feet. At just two minutes before

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H-hour, this drone failed to respond to a full "down-elevator" signal which the corresponding Mother was transmitting. The drone stalled to the left, dived at 250 mph, and engaged in a series of gyrations. The next dive (380 mph) ended in two successive inside loops followed by further gyrations. The final dive (260 mph) ended in an explosion as the aircraft hit the water. The crash occurred twenty-two miles from the target on a heading of 348° at approximately 0622 hours.

The third exception to the plan was caused by the "shear effect" in the atomic cloud at altitudes [REDACTED] Drone aircraft at these [REDACTED] altitudes were unable to make the third penetration of the atomic cloud because the "beeper pilots" aboard the two Mother aircraft could not discern any portion of the cloud at their levels.

In respect to the weather aircraft with the runaway propeller, the decision of the Commander, Air Forces, to direct the plane to proceed to Kwajalein, rather than land at Eniwetok, was based upon the fact that the Island of Eniwetok was already seriously overcrowded and activities were then in full swing with drones taking off; that no major repair facilities were available on the Island; and that the evacuation problem on the Island would be further complicated by the addition of personnel. The calculated risk involved in dispatching this aircraft over 370 miles of water with one engine inoperative, was partially counter-balanced by directing a B-17 aircraft to accompany

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it to Kwajalein, plus the fact that Air-Sea Rescue planes stationed enroute were alerted.

A secondary explosion to the right of Engebi Island a few minutes after H-hour was the first intimation the Commander, Air Forces had of the possible loss of an aircraft. Commander, Task Group 7.4, was immediately directed to check all of his aircraft and report whether any were missing from the pattern. Possibly through misunderstanding of the request, General Ramey reported a half hour later that all aircraft were accounted for on a communications check. However, the Commander, Air Forces was informed of the loss of the drone at 14,000 feet when it was confirmed by the mother plane's report. Commander, Task Unit 7.4.2, stated that he did not wish to cause undue speculation and disturbance on the part of other air crew personnel at a time so close to H-hour. This was considered good judgment on his part. The transmitting facility which ordinarily would have been used would not function properly, and the only other communication between aircraft with Task Unit 7.4.2 and its use for other purposes was not contemplated. As a result, no detailed report of the loss of the drone was made until after the Commander, Task Unit 7.4.2, landed at Eniwetok. However, this did not interfere with the balance of the operation which proceeded smoothly.

The third exception to this plan, the failure to make the third penetration of the cloud at 18,000 and 20,000 feet, was authorized by the Commander, Air Forces, when it was realized that it was doubtful whether the second penetration has been successful. There had been

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considerable discussion as to the altitude at which this "shear effect" would take place in the atomic cloud. The plan provided for three penetrations of the cloud, but there was a general understanding that, should this break in the cloud appear, the pilots would attempt to direct the drone aircraft through any remains of the cloud. If there was no visible evidence of the cloud, the pilots would then call General Kepner for further instructions as to their procedure.

In conclusion, it can be stated that the drone aircraft collected air samples from the atomic cloud in a manner which met the requirements of the scientists. Five drones made three penetrations each at their assigned altitudes, and two drones made two penetrations each. The weakest sample collected on this first test was stronger than the strongest sample collected on Operation CROSSROADS.

Helicopter operations on the first test day were conducted as outlined in Annex H to Commander, Task Group 7.3, Operations Plan No. 1-48, Change No. 5. The officer in charge, Helicopter Department, based on the CVE (USS BAIROKO), reported to the Commander, Air Forces, as required on 13 April 1948 at 0001 hours, and operations were carried out as planned by Task Group 7.3. Helicopter operations which contemplated the pick-up of samples from buoys in the lagoon were unsuccessful because the blast effect had either completely blown the samples away or had destroyed the pick-up device to such an extent that recovery of the samples by the aircraft was impossible. Many of the carbon samples on the ground neutron cable were no longer attached to the cable after H-hour. There

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was no rescue work involved in the whole operation on "X" day.

The tank operation was successful up to a certain point. Several ground samples were picked up by the tank which was directed by an operator in helicopter hovering above Engebi Island. These were returned to personnel at the far end of Engebi, but they were too weak to be of much value. The tank was then directed into the crater where, because of unfavorable terrain features, it became inoperative in spite of continued transmissions from the electronic control on the helicopter. It was decided that the stand-by tank should not be directed into the crater because it too might become inoperative in a dangerously radioactive area and, as a result, there would be no radio-controlled tanks available for the second and third tests. Those samples which could be recovered by helicopter were returned safely to the BAIROKO.

Shortly after detonation occurred and as soon as sufficiently daylight was available, the liaison aircraft carrying photographic and radiological safety personnel took off from Eniwetok to collect exposed film and establish radiological safety areas.

Photographic operations on "X" day were considered to be successful from the standpoint of both the technical and documentary phases. A number of the aircraft reported operational failure of certain types of cameras, but it was estimated that at least 85% operated satisfactorily during the test, although actual results cannot be evaluated accurately until all film is developed. There is the strong possibility

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that low clouds in the target area partially obscured initial data.

The mission of the weather aircraft on "X" day was successful from the standpoint of tracking the cloud and reporting weather information. With the exception of the incident involving the loss of a propeller on Immitation Two referred to above, all weather aircraft performed their missions as required.

Rapid transportation of test samples and photographic film to the Zone of Interior immediately following H-hour was accomplished by the use of four (4) C-54 type aircraft which were ready for take-off at Eniwetok beginning a few hours after the detonation. A fifth aircraft was scheduled but not needed. The four aircraft departed Eniwetok during the next twenty-four (24) hours as cargo became available and flew non-stop to Hickam Field. Here trans-shipment was effected to awaiting aircraft which were immediately flown to the Zone of Interior.

2. "Y" DAY OPERATIONS

Air operations on "Y" day were the same as those accomplished on "X" day with the following exceptions. A drone at 20,000 feet altitude was removed from the air pattern and placed at 30,000 feet to simulate the dropping of an atomic bomb on the target. This drone followed a course which would have enabled it to drop an atomic bomb aimed at the Zero tower timed to explode at H-hour. The aircraft was immediately over the explosion at time of detonation and was at a slant range sufficiently great at the time the shock wave hit it that no structural

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damage resulted. At the time the drone was immediately over Zero-point a picture was taken of the explosion, this accomplishing the only vertical photograph of the operation. The shock wave striking the aircraft, following the simulated dropping of the bomb, was of such force that the "beeper" pilot had some difficulty in controlling the drone and, as a result, Colonel Kilgore recommended to the Commander, Air Forces, that the drone be directed to land immediately rather than attempt to penetrate the cloud to secure air samples. By so doing, he assured the return of the vertical photograph, which would have been destroyed had the drone been directed through the atomic cloud, and the valuable blast data which had been secured was not subjected to further danger. The loss of air samples at the 20,000 foot altitude, and the failure to receive air samples at the 30,000 feet altitude was compensated for by the excellent vertical photographs of the explosion, the shock wave data, and the knowledge that an aircraft could have actually dropped this atomic weapon. The drone at 20,000 feet was selected for this purpose because on the X-day test there had been a shear effect in the atomic cloud at that altitude, and as a result the drone made only two penetrations of the atomic cloud, and the air samples were correspondingly weaker. The shear effect in the cloud on "Y" day was not as pronounced as it had been on "X" day, but it did not occur, however, at approximately 20,000 feet. An alternate plan had been developed for employment in the event of heavy cloud interference at

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30,000 feet. This plan provided for the redistribution of all aircraft in the upper part of the pattern to stations below the cloud level. However, weather conditions were such to make the implementation of this plan unnecessary.

At the briefing held 1300 hours 27 April 1948 the weather officer and radiological safety officer stated that the forecast at that time pointed to a satisfactory condition existing for the test on 30 April. It was further pointed out, however, that there was distinct possibility of an adverse front moving into the area, and there was danger of a wind shift at high altitudes. After consulting members of the staff, General Barker recommended to General Hull that the operation proceed as planned. Within the next two days a wind structure unfavorable from the viewpoint of radiological safety developed, and General Hull decided that operations be postponed for twenty-four hours. The briefing at 1100 hours 30 April 1948 pronounced the forecast weather satisfactory for all concerned, and it was decided to proceed with the test on 1 May 1948. At subsequent weather briefings the weather forecast continued to improve and at the last briefing, prior to the time of firing, all conditions were pronounced "ideal".

All air operations proceeded on schedule with no major difficulties encountered. The drone scheduled to fly in the twenty-four (24) thousand foot pattern had a tire failure as it was being taken off from Eniwetok. The ground control "beeper" pilot noticed an excessive syphoning of gas

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from the right wing tank, and he cut the throttle and applied the brakes to stop the drone before it reached the end of the runway. The right brake locked, causing the aircraft to swerve to the right, and the right tire blew out. The aircraft was moved off the runway, and a spare drone was substituted for it.

Helicopter operations proceeded according to the plan as outlined by Task Unit 7.3.4. Test samples were collected from the Zero Island, and the cable in the lagoon without incident. The first radio-controlled tank was directed by remote control into the crater to collect ground samples where it became inoperative as before, and the second tank was used to successfully complete this mission.

After the drones had been washed down with kerosene and distilled water and were declared radiologically safe, they were returned to Kwajalein and given a complete check prior to "Z" day operations.

Air samples collected by the seven (7) drone aircraft which penetrated the atomic cloud were declared to be fifteen (15) to seventy-five (75) per cent stronger than those received from the "X" day operations. Photographic personnel classified over ninety (90) per cent of the cameras as operational, and both General Hull and Dr. Froman stated that they were pleased with the results obtained.

The enclosed charts provide further information in connection with "Y" day operations.

3. "Z" DAY OPERATIONS

Air Operations for "Z" day were the same as those accomplished on

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"Y" day with the following exceptions. The simulated bomb run by drone aircraft was made at 20,000 feet instead of 30,000 feet altitude. An additional manned B-17 aircraft was operated on a course parallel to and directly West of this drone at a minimum distance of 35,000 feet slant range from Zero Point when the shock wave overtook the aircraft. Three of the aircraft at 20,000 feet altitudes were specially equipped to record photography and shock wave data. The other main change in operations was the placement of the photographic aircraft at a slant range of eight instead of ten nautical miles from the point of detonation.

At the briefing held 1300 hours 12 May 1948 the Weather Staff Officer and the Radiological Safety Staff Officer stated that the forecast indicated a satisfactory condition for the test on 15 May. There was some question about the wind direction at a high altitude, but the staff decided to proceed with operations as planned. At subsequent briefings during the next two days, weather conditions continued to improve and, as a result, the final decision was made to fire the weapon at 0604 hours 15 May 1948 for the third test.

All aircraft arrived on station by 0530 and completed their assigned missions successfully with the following exceptions. The Mother aircraft controlling the drone at 20,000 feet had difficulty with the AN/APS-10 (radar used to give exact position) and was unable to locate itself accurately with relation to the Zero Point. The

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simulated bomb run was aborted but the pilot continued with the secondary missions, that of obtaining cloud samples, and accomplished it successfully.

All eight (8) drones made the required three (3) penetrations of the cloud, and the air samples collected were said to be better than any previously obtained. The drone at 20,000 feet collected the strongest sample obtained during the entire operation. The special shock wave recording equipment aboard three of the drone aircraft worked perfectly, and as a result, the data received was considered extremely valuable. All of the drones were landed at Eniwetok successfully, were decontaminated during the next few days and returned to their station at Kwajalein.

The weather aircraft performed their assigned mission without incident. The Staff Photographic Officer stated that the photographic equipment was 97% operational. The helicopter operation was considered to be successful in spite of the fact that the first tank again became inoperative after it entered the crater to collect ground samples. The standby tank was placed in operation and accomplished the mission successfully. The Combat Information Center and the Air Operations Room aboard the USS Mt. McKinley were functioning throughout the period of air operations.

At the briefing held the next day the test director expressed complete satisfaction with all of the air operations and stated that a great deal of valuable scientific data was secured which, when analyzed

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should add much to the total information about the characteristics of the new atomic weapons.

The Air Force personnel engaged in Operation STANDSTONE could well be proud of their part in the proof-testing of atomic weapons at Eniwetok Atoll.

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CHAPTER VIII

ROLL-UP

1. COMMANDER, JOINT TASK FORCE SEVEN PLANS ROLL-UP OPERATIONS

The Chairman of the Atomic Energy Commission on 24 December 1947 suggested to the Joint Chiefs of Staff that Joint Task Force SEVEN, with the Atomic Energy Commission, work out details as to the degree of permanence and the disposition or property relative to future tests. The Joint Chiefs of Staff instructed the Commander, Joint Task Force SEVEN on 20 February 1948 to carry out this suggestion.

General Hull was cognizant of the problem of roll-up and had directed that planning proceed early in December and January and a series of roll-up conferences were held in February at Oahu discussing the problems involved. General Barker prepared a standby for Atomic Energy Commission proving grounds on 6 January 1948 in which assumptions were made as to the permanence of the Eniwetok area. Lt. Colonel Lincoln, Deputy Chief of Staff, Joint Task Force SEVEN, was given the duty of initiation of plans for roll-up of operations, and at a conference at Oahu 6 February 1948, he outlined the overall plans for roll-up. At that time he stated that final orders could not be issued until the directive from the Joint Chiefs of Staff was received, but that the roll-up board, consisting of representatives of the various services, would meet and prepare for any eventuality.

Thus, it can be said that there was established a progressive roll-up plan early in the operation. As various engineer units completed their construction work and as civilian contractors accomplished their

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mission, they were immediately released from duty in the proving ground area. Every attempt was made to eliminate a pile up of materiel and personnel at the ports. A competent observer compared this roll-up operation to that of a circus moving to the next town for a show. When the last act was over, only the equipment used in the last act was still on the site.

Field Order No. 1, Joint Task Force SEVEN, dated 11 November 1947, set forth the authority for the establishment of the Joint Task Force SEVEN and provided for the Armed Services participation in the Atomic Energy Commission's testing of atomic weapons. This field order had also provided for the withdrawal and roll-up of the materiel and personnel used in SANDSTONE, but had not discussed this problem in detail.

2. FIELD ORDER NO. 2 IS ISSUED

Field Order No. 2, Headquarters, Joint Task Force SEVEN, dated 8 March 1948, established plans and procedures to be followed in the accomplishment of the roll-up. This second order followed the same general plan of roll-up as the previous one, but discussed in detail the actual problems involved, and made assignments and commitments for the various Task Groups to follow in making their detailed plans for the return to home stations.

The "roll-up" field order thus extended the mission of Joint Task Force SEVEN to include appropriate preparations for future tests and the complete and timely roll-up of SANDSTONE in the light of such

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preparations.

The Army Task Group Commander, (CTG 7.2) was given the responsibility of preparations ashore for future tests on the Eniwetok Atoll. He was charged with the proper disposition of all personnel, property, and records of Task Group 7.2, when no longer required for use in the tests or in roll-up procedure. He was further charged with rendering all necessary assistance to Task Group 7.1 in its roll-up activity. Commander, Joint Task Group SEVEN specifically prescribed what SANDSTONE facilities and supplies were to remain on the islands after roll-up activities and these supplies were turned over by appropriate means to the Commander having post-SANDSTONE responsibility for Eniwetok Atoll.

The Navy Task Group Commander (CTG 7.3) was responsible for the proper disposition of all property, personnel and records of Task Group 7.3, and for the Naval preparations which were taken to preserve the area for future tests.

The Radiological Safety Group (TG 7.6) continued throughout the roll-up their responsibilities as set forth in Field Order No. 1. On "Z" plus fifteen (15), Commander, Task Group 7.6 furnished the Eniwetok Commander with a radiological safety status report which defined the areas contaminated by radioactivity.

The Island Commander Kwajalein (CTG 7.7), was responsible for the surface shipments from Kwajalein and for assisting Task Group 7.4 in packing and crating and for the final disposition of property, personnel and records of Task Group 7.7. He was responsible for proper disposition

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of all Joint Task Force SEVEN buildings and facilities which came under his control during or after the tests.

The Air Task Group Commander (CTG 7.4) was responsible for the packing and crating and the disposition of all property, personnel (assigned or attached), and records of Task Group 7.4. He was further charged with the responsibility of policing the areas occupied by his units prior to departure.

All Task Group Commanders were charged with the responsibility of submitting roll-up plans for their own organizations to Commander, Joint Task Force SEVEN for informational purposes. Annexes to Field Order No. 2 were issued outlining general departure times, air lift available, ships available and times of loading, with schedules so arranged that complete loading of cargo space could be accomplished in the most expeditious manner. Security regulations were stressed and Security Termination Statements were included. Each service was directed to prepare for the disposition of its property in accordance with existing regulations. Maps were submitted outlining the areas to be prepared for standby status and detailed instructions were given for razing buildings that might possibly be a hazard during storms, high winds or fires. Estimated man days of labor were set forth to provide information as to the force needed to accomplish the work. Administrative procedures to be followed in the close-out of the operations were included in detail.

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3. ROLL-UP PLAN FOR TASK GROUP 7.4

In compliance with paragraph 4 of Field Order No. 2, Headquarters, Joint Task Force SEVEN, Task Group 7.4 submitted a revised "Withdrawal and Roll-up Plan on 25 March 1948. In reading this plan after the accomplishment of the mission, it is easy to understand why things moved along so smoothly in the roll-up of Task Group 7.4. From the earliest action that took place on "Z" minus fifty (50) days, there was evidence of clear thinking on the part of the planners of Task Group 7.4.

"Z" minus fifty (50) days was chosen as the time to clear the island of all equipment and supplies which had been determined to be excess to requirements. The material was prepared for shipment to either Oahu or the Zone of Interior. Pack-up of all supplies and equipment which were declared excess to the final test was started on "Z" minus ten (10) days. On "Z" minus five (5) days packing and crating, sections were established and teams to inspect this work were organized under the control of the Air Installations Officer. Property turn-in sections were established in central locations. Definite job assignments and responsibilities were announced. Transportation control was tightened. As time progressed, more and more of the equipment was brought to central points for packing and crating. After "Z" Day, an LST was dispatched to the surrounding islands to assist weather personnel in their roll-up activities.

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One of the biggest problems that faced Task Group 7.4 was the determination of the destination and the final disposal of the equipment and supplies. There were five things that could happen to these supplies and equipment. First, it could be returned to the home stations with the units if it was serviceable and was properly part of the unit equipment. Second, if it was serviceable and surplus to the needs of Pacific Air Command, it could be returned to the Sacramento Air Depot for storage. Third, if it was serviceable and required by Pacific Air Command, it could be shipped to Oahu. Fourth, it could be taken over by the Air Base Unit on Kwajalein for use there if that unit had a need for it. Fifth, if it was unserviceable, it could be surveyed by an accountable survey officer and destroyed at Kwajalein. Each of the above actions required certain decisions by responsible officers that were very difficult in some instances to make. The bulk of the supplies and equipment were actually returned to the States for use by the units themselves in future activities.

After "Z" Day, Kwajalein took on all the characteristics of an outfit packing up to go home after a series of maneuvers in a forward area. On 11 June 1948, the USS WARRICK departed with 210 officers and enlisted men and over 4,000 ship tons of supplies and equipment. Almost a thousand ship tons of supplies and equipment were shipped to Oahu via available water transportation during the first two weeks after "Z" Day. Various air units in the Pacific Area requested and were shipped large amounts of C-54 and B-17 supplies and equipment. Over 600 of the personnel of Task Group 7.4 were moved to their home stations by unit aircraft.

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nearly 350 were moved by the Air Transport Command, and the remainder were carried by surface craft. Problems of packing and crating that seemed to present impossible obstacles in the planning phase were accomplished in much less than the estimated time. There was no eight-hour day on Kwajalein as the units of Task Group 7.4 were packing to go back to their home stations. By "Z" plus thirty (30), the facilities on the island of Kwajalein were turned over to the Island Commander and the Air Transport Command which was to remain.

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CHAPTER IX

COMMENTS AND RECOMMENDATIONS

Every military operation of considerable magnitude almost invariably produces some accomplishments which are praiseworthy and others which leave something to be desired. Familiarity with some particular aspect of the operation usually encourages one to consider himself qualified to evaluate not only the quality of these accomplishments but also to pass judgment on the thinking which influenced that quality. By the simple exercise of hindsight it is easy to place the stamp of approval on those decisions which contributed to the success of a particular phase of an operation and to criticize those which appeared to affect that phase unfavorably. It is somewhat more difficult, however, to be certain that such conclusions will remain valid when applied to the operation as a whole. Even when complete validity is established for an evaluation of past events and of the judgments which produced them, it is not possible to guarantee that similar judgments will in the future produce similar effects. Nevertheless, improvement in the fruits of human endeavor can generally be expected only when the knowledge gained from human experience is utilized. Consequently, the discussions and the recommendations in this chapter are recorded with the hope that they may prove useful in the future even though they admittedly represent a unilateral point of view. The order in which they appear herein is not necessarily to be considered as the order of their relative importance. Their later usefulness will finally be determined by

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the understanding which develops with the passage of time.

THE TIME ELEMENT

If, among the many conclusions which can be drawn from Operation SANDSTONE, one of them can be said to be more incontestable than any of the others from the Air Force point of view, that one has to do with the urgent demands of time. Although the more important deadlines were met throughout the operation, it was repeatedly apparent that lesser undertakings, and particularly those which were unforeseen at the outset, were handicapped by the shortage of time available for their accomplishment. It was also apparent that many opportunities created by Operation CROSSROADS had not been followed up with the vigor which was then indicated. In general, it can be said that Air Force participation in Operation SANDSTONE was limited to air operations only. An anomalous situation exists in that the United States Air Force is the only branch of the armed services now equipped to deliver an atomic weapon to a hostile target, yet its participation in the program of atomic research compares very unfavorably with that of other services. The conviction is inescapable that deficiencies in this regard must also have been evident at the conclusion of Operation CROSSROADS and that the subsequent effort to remedy the condition was inadequate. It is imperative that this problem immediately be given the attention which it deserves and that the training of personnel

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who can fill this vacuum be undertaken and prosecuted to its completion.

LOCATION OF AN ATOMIC WEAPONS PROVING GROUND

The selection of a site suitable for testing atomic weapons involves many considerations which are difficult to reconcile. The widely current belief in the pervasiveness and the deadly effect of an atomic explosion now makes it necessary to conduct such tests in an area far removed from human habitation. In reality, the interests of safety require only that the site be (1) located in an area in which the winds can be depended upon to drift the cloud away from inhabited areas and (2) isolated only to the extent necessary to avoid the injury to personnel and the damage to property which might result from the heat and concussion produced by the explosion. Otherwise, isolation is important only as an adjunct to security.

Weather has been an important factor in all atomic tests conducted in the past and it is likely to remain so in the future because of foreseeable difficulties in the operation of cloud-sampling aircraft, the limitations of ground and aerial photographic techniques, and the effect of wind drift on the dispersion of the atomic cloud. Weather conditions favorable to the conduct of tests must include (1) good visibility between the point of detonation and camera positions in the air and on the ground, (2) absence of precipitation in a wide area around the point of detonation, (3) a minimum of cloud cover, and (4) wind characteristics in which a great degree of reliability with regard to velocity and direction at all altitudes prevails. Finally,

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this weather must be susceptible to accurate forecasting several days in advance. The localities affording the type of weather which meets these specifications should be examined and evaluated as atomic proving grounds in the light of other requirements.

Real estate of a satisfactory type and in ample amounts is a material requisite in any site under consideration. The number of personnel involved in the experiments, the vast quantities of equipment employed, the space necessary for the location of scientific measuring devices, and the relatively large "safety zone" required - - all of these factors influence the size of the area which must be available. One or more air strips capable of accommodating numerous heavy aircraft must be provided and supported by reasonably complete base facilities. It is desirable, of course, that the land on which the site is located be of little value for other purposes. There is reason to believe that each succeeding test may surpass those of the past in magnitude; consequently, the search for a suitable area should be conducted with consideration given to the need for future expansion.

Finally, the selection of a site should be influenced by the question of logistics. Even in the most ideal circumstances, logistic support required for atomic proof-testing assumes huge proportions. When such testing occurs in an area which can be supplied only by water and air transportation, the problem is magnified greatly by the number of personnel involved in support of the transportation effort itself.

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Of the specifications outlined above --- ease of logistic support, adequate amounts of land, suitable weather, and protection for inhabited areas --- Eniwetok Atoll meets only the last-named one. It is believed that a more satisfactory site meeting all of these specifications can be located. Selection of such a site should be undertaken without delay. By so doing, the construction which is essential to future tests can be initiated at an early date and the expense of maintaining the unsatisfactory facilities in the Marshall Islands area can be avoided. If, however, it is decided that this area is to be used in future tests, maximum conservation and planned expansion of facilities now existing at Eniwetok and Kwajalein should be undertaken.

MILITARY REQUIREMENTS IN ATOMIC TESTS

Operation SANDSTONE undoubtedly provided AEC personnel with much information which will be useful in the field of pure science, as well as with information which may lead to improved types of atomic weapons. Also, the operation afforded the military services some opportunities to seek the answers to questions which were purely military in nature. Consequently, military support of the AEC undertaking was entirely logical and desirable. It is certain that the tests could not have been conducted on such a large scale or completed with such dispatch without that support.

A basic doctrine promulgated at the inception of the operation

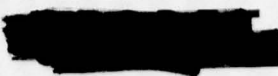
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stated in effect that experiments of a military nature would be permitted only when it was evident that they would not interfere with the conduct of AEC tests. Without attempting to minimize the importance of AEC objectives, it is possible that this policy may have been unjustifiably narrow in its intent. Certainly, its implementation was susceptible to unbalanced influence. The fate of every military experiment proposed for inclusion in the operation was almost inevitably determined by the opinions of individuals whose sympathies lay with the AEC test program. The prevalent lack of understanding by military personnel of the scientific aspects of such a program places them at an initial disadvantage when attempting to influence a decision in this regard. The military commander of an organization devoted primarily to scientific objectives is almost compelled to defer to the judgments of the scientific members of the organization on problems of a scientific nature. Unfortunately, under such a policy as the one mentioned above, it is possible for those members to veto proposed military research even when no concrete reason for objection can be discovered. Any weighting of the scale of opinion in a manner which enables one source of advice to exercise a disproportionate influence on the commander encourages the usurpation of command prerogatives. Before future tests of atomic weapons are scheduled, a balance of power should be established between scientific and military interests in order that national interests may be best served.

LOCATION OF COMMAND POSTS

In an operation of this nature, the work of all task groups must be coordinated with the greatest of care. Consequently, it is desirable for the task force headquarters and the command posts of the task groups to be located in close proximity to each other in order that this coordination may be effected with a minimum loss of time and effort. Any avoidable dispersion of the various headquarters in a task force creates serious problems of communications, travel, and logistic support. Such problems are increased when the headquarters are located on separate naval vessels because (1) the ships themselves and their operating personnel require extensive logistic support, (2) the transaction of official business by radio communications requires additional personnel to guarantee an adequate degree of security (3) the large number of radio channels employed tends to produce interference and (4) dependence on small boat transportation tends to limit personal contacts between staffs which should work closely together. In spite of advantages afforded by the use of surface craft, it is believed that much can be gained by shore-basing as many elements of the force as possible.



SECURITY

The seemingly irreconcilable nature of the eternal conflict between security restrictions and the desire for operational efficiency was well illustrated in Operation SANDSTONE. In any endeavor involving large numbers of people, there is no more certain way to court failure than to withhold from those people the information which they need to understand the importance of the relationship between their individual efforts and the community effort. An undertaking so vital to national security and of such international significance must, of course, be guarded from unfriendly observation to the maximum practical extent, but an attempt to obscure under "Top Secret" classification facts which are clearly evident to thousands of individuals does nothing more than create a fiction in which nobody believes.

Fortunately, a more realistic understanding of the requirements of the Atomic Energy Act and of the meaning of "AEC Restricted Data" developed as the operation progressed. In most instances, however, this new understanding resulted not from any modification of policy but from individual analysis instead.

Possibility of success in any undertaking usually necessitates the acceptance of calculated risk. This risk must be shared by all who participate in the undertaking. Those who devise the security regulations to be followed in an operation should continually remind themselves of their responsibility for the success of the entire operation. Prior to its promulgation, a security policy designed for application within a large task force should be closely examined from the viewpoint of the field commander to insure that all requirements established by the policy are realistic and workable at the level of the operating unit.

A fresh approach to the security problem seems to be desirable. That approach should be logical and realistic. It is possible that our notorious weakness in security matters can be remedied if we initially recognize the impossible aspects of situations which confront us and continuously strive to avoid the impractical aspects of those situations.

CONTROL OF AIRCRAFT

It is generally recognized that the degree of efficiency attainable under an arrangement of completely unified command can not be matched by any other system of control. However, under existing conditions, complete unification of command is patently impossible in any effort involving two or more of the armed services. As a substitute therefor "operational control" has been widely employed in joint endeavors and much dependence has been placed

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upon "cooperation" among the Services. Operational control has worked well as an expedient, but its scope has never been sufficiently defined to insure that a perfect alignment of command authority with command responsibility will exist in its employment. Nevertheless, under such an arrangement, it is possible for a reasonably clear-cut division of authority to be made and, as long as the Armed Forces endure as three separate branches, it seems logical that such division within a joint effort should, if possible, follow the line of reasoning which has resulted in the autonomy now accredited to each of the three.

Such a division almost, but not quite, existed with regard to the air effort in Operation SANDSTONE. The Commander, Air Forces, controlled all aircraft operating in the Eniwetok area during the actual time of the tests except the Naval patrol planes. This last remnant of control was presumably withheld from him on the grounds that anti-submarine patrol is a responsibility of the United States Navy. Whether or not primary service responsibilities should be allowed to govern the organization of a joint force is open to debate. The subject should receive consideration at the highest joint staff level.

STAFF OF THE AIR COMMANDER

With three exceptions only, the members of the staff of the Commander, Air Forces, Joint Task Force SEVEN, possessed no background of experience or information directly connected with the

testing of atomic weapons, and those three members joined the staff several months after its assembly was begun. The work of all members was retarded in some respects by the long period of time required for the issuance of "Q" clearances.

In future operations of this type in which a similar organization of the air participation is contemplated, it is recommended that (1) members of the staff be selected insofar as possible on the basis of prior experience in atomic tests, (2) the staff be assembled as soon as possible after the requirement for it is established, (3) a survey of the installations in the forward area be made by key staff personnel before preparation of the air plan is undertaken, and (4) a copy of this report be made available for use of the staff. The enlisted section of the staff should include at least two competent draftsmen and the highest degree of stenographic skill available.

LIGHT AIRCRAFT

Two liaison type aircraft organically assigned to the engineer unit responsible for construction in the target area were placed into use immediately after that unit arrived on the scene of operations. This number was augmented by additional light aircraft obtained from various sources until a total of fourteen were operating within the limits of Eniwetok Atoll. They proved to be so valuable as "time-savers" for key personnel whose duties required them to travel between the islands of the atoll that they should be

considered as a necessity in any future atomic tests conducted in a locality where landing facilities can be improvised. Also, the usefulness of helicopters as a means of transporting personnel and equipment to localities not accessible by light aircraft should not be overlooked in future planning.

REHEARSALS

The schedule of operations outlined in the Scientific Operating Plan (Task Group 7.1) naturally exercised a primary influence on the timing of all operations throughout the task force. This schedule was carefully coordinated with all task groups and ample proof of its adequacy was evidenced by the success of the entire operation. Its only weakness of any consequence (from the viewpoint of the air operation) was the short interval of time intervening between the full-scale rehearsal and the actual test.

As a matter of fact, this weakness had no injurious effect on the undertaking, but only because a second rehearsal prior to Xray day was not considered necessary and because the air rehearsals scheduled on Peter Yoke and Peter Zebra days were cancelled. However, the amount of work required to guarantee the participation of all scheduled aircraft in a test of this nature makes it almost mandatory that the air units be permitted to "stand down" at least sixty (60) hours prior to the time of takeoff on test operations. Consequently, it appears important in future operations to schedule

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the last full-scale rehearsal at least seventy-two (72), and possibly ninety-six (96), hours before the test which follows it will occur.

RADIO-CONTROLLED AIRCRAFT

The reliability of remotely-controlled aircraft as a means of collecting samples of material made radioactive by an atomic explosion was thoroughly demonstrated in Operation SANDSTONE. Twenty-three of the twenty-four aircraft dispatched on cloud-sampling missions obtained excellent results. No other method of sample recovery employed was productive of such a uniformly high degree of success.

Consequently, it appears certain that remotely-controlled aircraft will again be required in later large scale tests of atomic weapons. This probability points up the necessity for the maintenance of a unit equipped and trained to perform the cloud-sampling mission. The nucleus of experience now in the 1st Experimental Guided Missiles Group should be protected against the loss of identity which will inevitably follow disbandment of the unit or dispersion of the personnel.

In this connection, immediate steps should be taken to develop aircraft remote control equipment of improved design. The equipment used in Operation SANDSTONE was manufactured prior to the conduct of Operation CROSSROADS---it has been subjected to much wear and tear and no reliability can be placed in it for future operations. Immediate initiation of a project to develop improved equipment should

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guarantee increased flexibility and dependability in the remote control of aircraft by 1950.

TECHNICAL PHOTOGRAPHY

Responsibility for obtaining the photographic coverage required by Joint Task Force SEVEN in Operation SANDSTONE was assigned by the Joint Chiefs of Staff to the United States Air Force, and the Task Force Staff Photographer was charged with supervision of this mission. Experience gained during the operation indicates that improved scientific data can be obtained through photographic means if certain developmental work recommended in the report of the Staff Photographer is carried on. It is believed that the United States Air Force should be authorized to proceed with such a development program in cooperation with the Atomic Energy Commission. Furthermore, it is recommended that a study be made to determine the photographic equipment and techniques required to obtain essential information regarding the detonation of an atomic weapon over enemy terrain and that development of such equipment and techniques be initiated at the earliest possible time.

SUMMARY

The critical nature of some of the discussions which appear above should not encourage the reader to believe that any important basis exists for dissatisfaction with the conduct of Operation SANDSTONE. The success of the operation speaks for itself. The general soundness of the organization of the force, the coordination between its various elements, the harmonious relationships which

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prevailed, the universality of the desire to accomplish the job, the high quality of the leadership which was exercised---these factors were fundamentally responsible for that success. From the Air Force point of view, it is difficult to see how the results of the operation could have been greatly improved upon. It appears likely that the name "SANDSTONE" may ultimately be used as a hall-mark in the annals of atomic weapons tests.

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OPERATIONAL REPORT

TASK GROUP 7.6

PHASES A AND B

CHAPTER 1

Introduction.

In August of 1947 General James McCormack, Jr., the Director, and Captain James Russell, USN, both of Military Applications Division, AEC, called Colonel James P. Cooney, MC, USA, of the Office of the Surgeon General for a conference at the office of the AEC, and informed him that certain atomic tests would be conducted in the future at some site to be chosen in the Pacific area. They stated that his name had been suggested by Dr. Norris E. Bradbury of Los Alamos to head radiological safety operations. Colonel Cooney was asked if he would be willing to assume this responsibility, and he stated he would be willing to help in any way possible.

In the latter part of September Colonel Cooney was ordered to report to Lt. General John E. Hull for a personal interview at which time it was confirmed that Colonel Cooney was willing to assume responsibility for radiological safety operations, and that the Surgeon General had concurred in his release. Accordingly, Lt. General Hull stated that orders would be issued making the appointment official.

General Orders Number 2, Headquarters, Joint Task Force SEVEN, Washington, D. C., dated 18 October 1947, announced that Colonel Cooney

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would be the Radiological Safety Officer. He was charged with the responsibility of organizing a Joint Radiological Safety Group within JTF-7 for the operational detection and determination of intensities and types of radioactivity, and the protection of personnel from its hazards.

In October 1947 Colonel Cooney met with Captain Frank I. Winant, Jr., USN, Colonel Robert N. Isbell, CmlC, USAF, Dr. Herbert Scoville, Jr., Lt. Colonel Karl H. Houghton, MC, USA, and Major William W. Stone, CmlC, USA, all of the Armed Forces Special Weapons Project at the Pentagon in Washington. At this meeting Colonel Cooney outlined the proposed plan for the atomic tests and announced that a Radiological Safety Group would be formed.

On 18 October 1947 General Orders Number 3, Headquarters Joint Task Force SEVEN, Washington, D. C., announced the establishment of the Joint Radiological Safety Group, Task Group 7.6.

For a period of about three weeks during the month of October 1947 Colonel Cooney accompanied Lt. General Hull and his party on a survey of areas in the Pacific. This was in connection with the selection of particular ZERO islands, and Colonel Cooney accompanied the group to consider radiological safety aspects.

In November 1947 the Joint Proof Test Committee submitted the "green paper" to the Joint Chiefs of Staff. A certain portion of this paper, dealing with fundamental radiological safety rules to be employed in SANDSTONE, was drafted by the Staff of the Radiological Safety Group. This group originally consisted of Colonel Cooney, Commander Winant, Dr.

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Scoville, Lt. Colonel Houghton, Major Stone, and Lt. Commander Campbell, USN, of AFSWP. The primary rule included in this paper was that Commander, JTF 7, would be responsible for radiological safety of all personnel in the Task Force, both military and civilian. Mr. David E. Lilienthal, Chairman of the AEC, in replying to the paper requested that in certain instances the Scientific Director be authorized to establish radiological safety requirements for AEC personnel in connection with certain critical tests. The RadSafe staff group then prepared a dissent which was forwarded by Lieut. General Hull and approved by the Joint Chiefs of Staff.

In December this same Joint RadSafe Group, less Lt. Commander Campbell and now including Commander Thomas R. Fonick, USN, of the AFSWP, with constructive criticisms by Brigadier General James deF. Barker, prepared the radiological safety plan which was to become Annex "J" of Field Order Number 1, Joint Task Force SEVEN.

Considerable discussion centered around paragraph 1 of Annex "J" which states that radiological safety of all personnel is a command responsibility. This is considered to be a fundamental rule in radiological safety work and places the monitor in an advisory capacity to the leader of any party working in a radioactive area. However, there were certain rules written into the plan in various places which greatly strengthened the position of the monitor by removing from the party leader any right to review the monitor's findings concerning hazards in radioactive areas.

After considerable deliberation and discussion it was decided that the duties of Colonel Cooney as a member of the Joint Task Force Staff

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would be of such magnitude that it would not be feasible for him to command the Joint Radiological Safety Group, whereupon Captain (now Commander) Frank I. Winant, Jr., USN, was announced in General Orders Number 7, JTF 7, dated 22 December 1947, as Commander, Joint Radiological Safety Group, Task Group 7.6.

The establishment of the Joint Radiological Safety Group as a separate command represents an improvement to the plan utilized in Operation CROSSROADS to meet the safety problem. It was not the intent that the Commander of Task Group 7.6 should formulate policy but rather that he should exercise control of a functional group composed of Army, Navy, Air Force, Public Health and various civilian personnel. By carrying out the safety policy within a separate activity it was felt that an unhampered coordination of effort could be accomplished without needlessly impeding the over-all operation.

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CHAPTER 2

Personnel Procurement.

On 1 October 1947 Colonel Cooney and Captain Winant began considering the problem of obtaining personnel for the Radiological Safety Group. It was apparent that a small group of experienced personnel would be needed to conduct the planning, technical, and operational functions. These experienced personnel would have to be drawn from other important assignments and in general would come from the AFSWP and AEC. It was decided that this staff group should be as small as possible in order not to interfere unnecessarily with concurrent important work. It was also felt highly desirable that the majority of the group should consist of graduates of the radiological safety schools at Treasure Island and Edgewood Arsenal. The non-staff or monitor personnel would be picked from those having the best records at the radiological safety schools. It was desirable that all branches of the services have representatives in the Radiological Safety Group, thereby each service should benefit by the experience of the operation.

On 17 October 1947 a memorandum was sent to the J-1 Section, JTF 7, and constituted the basic request for personnel. Six officers and one civilian were requested immediately for the duration of the operation. These personnel, all from Headquarters AFSWP in Washington were needed to accomplish the planning stage of the operation, and to form a nucleus for the Radiological Safety Group. In addition, eight other specially qualified officers were requested by name to report by 15 January 1948. Procurement of these officers was given highest priority because of the

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amount of previous experience each had had in this work. Monitors for the operation were chosen from preferential lists prepared from the records of radiological safety school graduates. In general they were picked on the basis of their class standing. The break-down, respectively, from the various services furnishing these monitors is as follows:

	Principals	*Alternates
Army	13	14
Navy	13	26
Air Force	10	15
Marine Corps	1	1
USPHS	1	0

*When alert orders were finally issued for those principals definitely selected, 3 or 4 alternates from each service were alerted at the same time.

Enlisted requirements were four ETM's, well qualified in electronic instrument repair; five photographer's mates, with much experience in film development for work in photographic dosimetry; six yeomen and two storekeepers.

Also at this time arrangements were negotiated for the services of eight civilians from the AEC, other government agencies and from universities. Three of these were to furnish radiological safety and medical legal advice to Colonel Cooney. The remainder are instrument specialists and scientists believed necessary for the support of the operation.

During the period, 1 November to 15 December 1947, numerous discussions were held with the Career Management Sections of the various

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branches and services of the Army and Air Force and with the Bureau of Naval Personnel. It was found that many of the personnel requested in the basic memorandum were occupying key positions in their own organizations and could not reasonably be made available. Numerous substitutions and a few additions were made as the need arose. During this period the personnel needs were in a more or less fluid status because many of the projects were still in formative stages and a determination of absolute needs could not be definitely anticipated.

Meanwhile availability statements were coming back from the Air Force and lists were being forwarded to Career Management Units requesting that the personnel be earmarked for Operation SANDSTONE.

At this period it was estimated that the personnel requirements for the Radiological Safety Group would be fifty officers, seventeen enlisted men and five civilians. Ten of the officers would be air monitors, whose duty it would be to advise plane crews that were to be in the air at the time of the shot concerning radioactive intensities and to indicate paths of least intensity for entry and exit. They would also distribute film badges to plane personnel and collect them upon completion of the mission. These monitors would be based at Kwajalein after arrival at the test site under command of Colonel Isbell. In addition to the previously requisitioned personnel, the services of Lt. Colonel Joseph J. Cody, Jr., USAF, were requested by CTG 7.6. Also, two additional flight surgeons were requested from the AFSWP.

The original plan contemplated the use of one RadSafe monitor to

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JOINT TASK FORCE SEVEN WASHINGTON DC
OPERATION SANDSTONE NUCLEAR EXPLOSIONS. ATOMIC WEAPONS TESTS. 0--ETC(U)
1948

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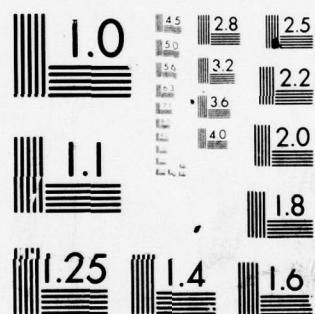
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accompany each party working on a project with a reserve of about 20% additional monitors. However, as the planning progressed additional projects were added necessitating a revision of monitor and technician requirements. As a result of this revision it was considered there was need for seventy-two officers and civilians, and seventeen enlisted men. Later, about 15 December 1947, the troop list requirements for the CVE-115 (ship designated to transport personnel of TG 7.6) were modified to seventy-five officers and civilians and twenty-six enlisted.

In December 1947 "Q" clearances were initiated for personnel of the Task Group at the request of the J-2 Section of the Task Force. On 15 January 1948 CTG 7.6 indicated the requirements, by name, of all personnel of TG 7.6 entitled to RED or GREEN badges.

About 22 January 1948 it was realized that the requirements for air monitors had been markedly underestimated, therefore the services of nine officers, Medical Service Corps, USAF, were requested in addition to previous requirement indications.

Special Physical Examinations.

Early in October it was decided that all individuals of JTF 7 who would be participating in work with or around radioactive material would require special physical examinations prior to leaving the United States. Examinations would consist of a complete physical to include chest X-ray, urinalysis, and complete blood count (red and white count, hemoglobin, and differential). Forms were made for these special physical examinations and sent to the various agencies within the Task Force for distribution to individuals concerned. If an individual had undergone a

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complete physical examination within the previous six months no further examination other than blood count, urinalysis and chest X-ray would be required.

Exposure policy.

A Standard Operating Procedure on exposure, what rest periods would be required in the event of over-exposure, and what would actually constitute over-exposure, was developed by Colonel Cooney and Lt. Colonel Houghton. They also established exposure policies with the basic formula at 0.1 roentgen per twenty-four hours as maximum except for certain specific urgent missions where exposure up to 3 roentgens would be permitted. In a conference with Dr. Darol K. Froman of the AEC, Test Scientific Director, it was determined that all missions involving the maximum 3r (3 roentgens) exposure would have to be personally approved by Dr. Froman and Colonel Cooney. No exposure above 3r would be permitted unless approved by Commander, JTF 7.

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CHAPTER 3

Instrument and Logistical Data.

At a meeting on 18 September 1947 called by Colonel Cooney a subcommittee consisting of Commander H. I. Andrews, USPHS, Lt. Commander Campbell, and Dr. R. E. Lapp, Research and Development Board, was formed to consider types and quantities of instruments required for the operation. It was estimated that sufficient radiological safety instruments for use by twenty-five monitors as a maximum would be needed for from one to three tests. The subcommittee was instructed to submit an interim report, preferably within one week. The subcommittee's first meeting took place about 20 September 1947 at which time the various types of instruments then available were discussed. Current information on instruments in the process of development was subsequently obtained by a rapid survey of work then going on in the Boston, Cleveland, and Chicago areas.

On 22 September the subcommittee presented an interim report, the basic recommendations being as follows:

A. Geiger-Mueller Survey Instruments		*Price	Quantity
a. Instrument Development Labs	#2610	\$ 280	20
b. Geophysical Instrument Co.	-	220	20
c. North American Philips Co.	-	270	20
d. Sylvania (NavDept)**	-		20
e. National Technical Labs	MX-5	250	20
f. Victoreen Instrument Co.	263	<u>475</u>	<u>50</u>
		\$42,150	150

*Approximate only--to be revised

**Not included in total price

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B. Ionisation Chamber Survey Instruments		Price	Quantity
a. National Technical Labs	#MX-2	\$ 300	20
b. Rauland Radio Co.	Zeus	300	20
c. Victoreen Instrument Co.	247	<u>500</u>	<u>60</u>
		\$42,000	100
C. Direct Reading Dosimeters			
(Pocket Electrometers)			
a. Landsverk Electrometer Co.	#L-200	\$ 35	500
	L-Sp	50	50
	L-300	<u>40</u>	<u>50</u>
		\$22,000	600
D. Direct Reading Dosimeters			
(Vacuum Tube Integration)			
a. Victoreen Instrument Co. (Proteximeter)	225		<u>25</u>
		\$ 5,625	25
Total		<u>\$111,775</u>	<u>900</u>

In addition to visiting instrument companies in the eastern areas of the United States, the subcommittee contacted companies in other parts of the country to determine the status of their development work in this field. Contact was made with interested agencies of the Army, Navy and Air Force as well as the Atomic Energy Commission to determine what work of related nature was being pursued by necessary agencies.

As well as making recommendations for the purchase of instruments then commercially available, the committee drew up tentative specifications for some instruments incorporating features not present in instruments then in production. These recommendations were as follows:

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- A. The Victoreen-247 ion chamber meter has four scale readings, 2.5mr per hour full scale, 1 X, 10 X, 100 X, and 1000 X. It was desired to obtain 10 instruments modified to have five scale ranges, 2.5mr per hour full scale, 1 X, 10 X, 100 X, 1000 X, and 10,000 X. The instrument company did not consider this practical in accordance with their current production design so a four-scale instrument reading 10 X, 100 X, 1000 X, and 10,000 X was agreed upon.
- B. The Rauland Corporation instrument is a portable alpha, beta, gamma meter. It was the subcommittee's recommendation that this instrument be modified to gamma reading only. It was further recommended that the instrument be placed in a metal case. These modifications, especially removal of the alpha-beta feature, would simplify the instrument and perhaps effect a reduction in price.

As a result of these specifications the Model 247-A (modified) manufactured by the Victoreen Instrument Company, Model MX-6 manufactured by the National Technical Laboratories, and the modified Zeus manufactured by the Rauland Corporation, were constructed specially for this operation. High range pocket dosimeters (10r and 50r) were constructed specially for this operation by the Kelly-Koett Company and the A. O. Beckman Co. Standard range dosimeters (0-.2r) were obtained from the Cambridge Instrument Company which manufactured them primarily as a result of stimulation by the subcommittee.

A serious bottle-neck developed with respect to Landsverk electrometers. This resulted from indecision on the part of Landsverk as to whether to

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expand his existing plant in Chicago or combine with the Kelly-Koett Corporation of Covington, Kentucky. If he continued with his present business it would be possible that five-hundred 0.2r meters could be obtained from parts on hand by 15 January 1948. On the other hand there was no promise of delivery on the higher range meters and he wanted a development or cost-plus contract to do the work. It appeared that immediate action was needed and it was the committee's recommendation that an order for less than five-hundred 0.2r meters be placed so that Landsverk might devote his time to the delivery of the higher range meters.

Delivery of the A. O. Beckman electrometers by 15 January was not considered possible, but an order was recommended for the purpose of stimulating production sources in addition to those of Landsverk.

The quantities of survey instruments recommended did not include allowance for more than six manned aircraft. Should more aircraft be involved it was recommended that the following quantities and types of instruments be procured for each aircraft: 1 ion chamber survey meter, 2 GM survey meters and 1 proteximeter.

It was further recommended that 40 alpha measuring instruments be procured; also 20 additional (un-modified) Rauland-Zeus, and 20 AEC designed Pluto meters, Model 356, from a lot of 125 manufactured by the Victoreen Company and delivered approximately July 1947 to the Atomic Energy Commission.

In October 1947 the Bureau of Ships had under development between the Naval Research Laboratory and the Sylvania Electric Products Company

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a GM survey meter of reported advanced design. It was decided that 25 of these meters should be taken. Commander Gould Hunter who was responsible for the BuShips development program made strong recommendations against the use of the BuShips instrument because he feared unfavorable prejudices would be created by the use of an undeveloped instrument.

It was further decided, since all instruments listed in the final subcommittee report were new and untried, that 25 Victoreen 247 ion chamber survey meters should be taken. (Only 12 of these instruments were received).

Final report of the subcommittee covered only survey instruments and did not include any instruments required for laboratory purposes.

In general the recommendations of the subcommittee were accepted but in some instances quantities were increased notably on the model 263-A GM counter and the Model 247-A ion chamber instruments manufactured by the Victoreen Instrument Company. These increases were felt desirable since the two instruments were modifications of previous designs which were considered reasonably satisfactory and it was felt that health protection should not rest wholly on indications obtained from new, untried meters. As soon as the requirements were firmly established, orders for these instruments were placed through the AEC. Delivery dates were short but in almost every case the manufacturers were very cooperative in attempting to meet them.

On 8 October 1947 Colonel Cooney directed that with some modifications the list of instruments recommended by the subcommittee be turned over to the AEC for procurement. Major Maxwell Dauer, Military Applications Division, AEC, was designated for liaison by AEC. A letter was sent to Major Dauer containing lists of instruments and specifications for spare

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parts and indicating that additional lists would be forthcoming. At that time delivery was desired by 1 January 1948 to the Oakland Army Base, Oakland, California. A request was made that one of each portable survey instrument be delivered to Lt. Commander Campbell at the AFSWP for examination by interested parties. A list of specifications for spare parts was compiled by Lt. Commander Campbell with the advice of Commander Andrews in accordance with Navy specifications as follows:

Navy Dept Specification 42-B-9 Boxes, Spare Parts,

Electrical and Mechanical (Shipboard Use)

BuShips, Radio Division, Specification RE 13A 937

General Specifications for Packaging and Packing,

Navy Radio, Radar and Sonar Equipment

Army-Navy General Specification for Packaging and

Packing for Overseas Shipment - US Navy

Specification 39-P-16

Joint Army-Navy Specification JAN-1 for Radio Electron Tubes

BuShips, Radio Division Specification XA-8810

Listing parts and spare parts

In drawing up the specifications, consideration was given to the particular types of instruments being obtained and their probable use under tropical climate conditions; e.g. all portable electronic survey instruments were to be provided with loose transparent plastic rain covers.

On 5 November 1947 a memorandum for Colonel Cooney from Major Dauer indicated that the survey instruments which had been requested were under procurement by the AEC. Dust collectors of improved design were being produced by the Mines Safety Appliance Company. Ten-thousand film

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badges with range, 0-10 roentgens were being supplied by the Eastman Kodak Company which had also promised information concerning the total range on casualty film badges. It was learned that the Ansco-Sweet densitometers were not available and Major Dauer suggested substitution by either a photo-volt or Weston Densitometer.

In November 1947, Colonel Cooney, Captain Winant, Lt. Colonel Houghton, Commander Andrews and Lt. Commander Campbell made a trip from Washington, D. C., to Annapolis, Maryland, for the purpose of inspecting a CVE similar to the one which was to be used to transport TG 7.6. It was decided that the after pilot ready room would be the most desirable place for the instrument repair shop because of its space, air-conditioning and access to the hanger deck. Examination of the ship's photographic laboratory indicated that it would be adequate for film badge processing if the temperature could be controlled near 68° F. The air-Plot and CIC spaces appeared suitable as monitor control centers. As soon as it was decided that a ship of the type examined could be used on the mission a letter requesting that necessary modifications be made on the assigned ship was sent to the Chief of Naval Operations on 17 November 1947.

During the week of 1 December 1947 Dr. Lapp and Mr. Dahl, AEC, made a visit to the National Technical Laboratories in South Pasadena, California. There it was discovered that the ion chamber survey instrument being manufactured by them was the model MX-2 which was not the field instrument desired for the proposed operation. Dr. A. O. Beckman, president of this company, indicated that his concern could produce a much superior instrument and requested specifications. On approximately 8 December discussions were held among Dr. Lapp, Mr. Dahl, Dr. Andrews

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and Lt. Commander Campbell, and the recommendations formalizing this request were set forth in a memorandum to Major Dauer on 22 December 1947.

Changes were as follows:

- Model MX-2 - - Reduced quantity from 20 to 10
- Model MX-6 - - Ordered 20
- (New instrument)

The model MX-6 was to be manufactured in accordance with the following specifications:

- a. Weight: 10 lbs maximum.
- b. Maximum case dimensions: 4" x 6" x 10".
- c. Handle: hinged, polished unpainted metal or plastic.
- d. Case to be metal, heavy enough for field use. Surface to be smooth for ease of decontamination; anodized, lacquered or smooth paint finish (no crackle-finish).
- e. Case to be water-proof tested under 5 feet of water for two hours.
- f. Detector component to be an ionization chamber containing sealed air at approximately 740 mm mercury pressure at 20° C.
- g. The instrument to be tropicalized in accordance with standard Army-Navy specifications.

Following were the circuit requirements:

- a. It must be possible to check the zero setting in a field equal to the maximum radiation measured by the instrument.
- b. After 60 seconds warm-up period, the zero drift to be less than 5% of full scale per hour on any range.
- c. Five ranges of sensitivity were requested:

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1. 0-4 mr/hr
 2. 0-40 mr/hr
 3. 0-400 mr/hr
 4. 0-4000 mr/hr
 5. 0-40,000 mr/hr
- d. The microphonics to be held to a minimum. On any one of three one-inch drops produced by suddenly pulling a one-inch board from under one end of the instrument the meter reading would not go over one-half full scale on any range of sensitivity.
- e. The instrument was to be calibrated by gamma rays from radium and to conform to the sensitivities specified in (c) above within an average of 10% of full scale at any point on the scale.
- f. The circuit to be so designed that after switching from one range to another not more than 10 seconds would be required to reach 90% of the final reading.
- g. The instrument to be sensitive to gamma radiation and the wall of the chamber to be composed of a material with the atomic number less than ten such that the instrument would be wave length independent from all X and gamma radiation with energies above 5 Kvp, and beta particles with energies less than 1.0 MEV to be excluded.
- h. The circuit time constant to be such that 90% of the final reading of the instrument would be reached within 10 seconds or less.
- i. The instrument to operate under the above requirements over ranges of temperatures from minus 5° C to 70° C and with the relative humidity of 95% for a period of twenty-four hours.

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- j. The instruments to be battery operated with a battery life which would provide operation for 30 days at a rate of 8 hours continuous each day. Batteries to be easily checked and replaced. Standard Army-Navy types of batteries suitable for tropical use were desired.

It was realized that some of the above specifications would not be completely met and some relaxation of the requirements were anticipated.

On 6 January 1948 a letter was received from Mr. Adrian Dahl (AEC) who had been attempting to place the contract for the MX-6 with the National Technical Laboratories. The National Technical Laboratories requested the following changes be made in the specifications outlined above:

- a. The warm-up period should be increased from one minute to two minutes.
- b. The microphonic specifications be modified to include a zero shift of not more than 2% of full scale on any one of the drops during the microphonics tests.
- c. Range of temperature from minus 5° C to 50° C with operation up to and above 70° C desired.
- d. The battery life to be 25 days at a rate of 8 hours continuous each day.
- e. The maximum exposure readable on the proposed instrument would be 5000 mr per hour.

The above changes in specifications were agreed to by all concerned.

Various items of supply covering a wide range of materiel were under procurement during this period.

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Colonel Cooney expressed appreciation for the outstanding manner in which the instrument committee, namely, Dr. Andrews, Dr. Lapp, and Lt. Commander Campbell, determined numbers and types of instruments to be used, and further expressed appreciation for the outstanding service of Major Dauer, Mr. Bray, and Mr. Dahl in their procurement. If it were not for their outstanding effort it would have been impossible to procure this large number of instruments in such a short time.

About 1 January 1948 Commander, JTF 7 designated Commander Winant as loading coordinator of CVE-115, both for materiel and personnel. On 15 January 1948 Lt. Commander Campbell established an office in Naval Shipyard, Terminal Island, Long Beach, California, as West Coast representative of Commander, Task Group 7.6, and exercised active supervision in outfitting the Task Group shops on the CVE-115. He also acted as receiving officer for radiological safety material which had been shipped to Terminal Island, California. A small group of enlisted personnel reported to Terminal Island at this time and assisted Lt. Commander Campbell in the inspection of all material upon receipt.

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CHAPTER 4

TECHNICAL MEASUREMENTS

Introduction of Projects.

As a result of analysis made on CROSSROADS technical information and attempts to apply these data to practical situations it was indicated that much additional information was needed to adequately prepare for defense against atomic bomb attacks.

On 8 September 1947 Dr. Herbert Scoville, Jr., and Major W. W. Stone, Jr., CmlC, USA, made a rough outline of a program of measurements which would be desirable in any future tests. These were discussed by Captain Winant and Dr. Scoville with Captain James S. Russell, USN, of the AEC, and later with Admiral Parsons and Captain Thomas Hill, USN. Captain Winant, with the approval of Admiral Parsons, suggested that Dr. Scoville be made available to work on planning for the forthcoming tests. Arrangements were made to submit a smooth copy of this program and discuss it with Dr. Norris E. Bradbury of Los Alamos on the following day.

On 9 September 1947 the program was submitted to Dr. Bradbury and discussed at a meeting at which Dr. Bradbury, Captain Russell, Captain Hill, Dr. Scoville and Major Stone were present. Following is a list of projects proposed at this time:

1. Gamma Radiation Measurements.
 - a. Gamma dosage versus distance
 - b. Gamma ray spectrum
 - c. Gamma intensity versus time

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- d. Size and location of source
- e. Absorption by thick and angular shields
- 2. Neutrons.
 - a. Neutron spectrum
 - b. Neutron flux versus distance
 - c. Neutron absorption and scattering
 - d. Neutron flux versus time
- 3. Residual contamination.
 - a. Direct contamination
 - b. Downwind fall-out
- 4. Radioactive Cloud.
 - a. Air sampling
 - b. Radiation field from cloud
 - c. Long range detection

At this meeting Dr. Bradbury raised the question of who would be available to undertake the work outlined in this program. Although it was considered desirable to have Dr. Gerhard Dessauer undertake the gamma radiation measurements, the AEC felt it was inadvisable to request his services from the General Electric Company at this time. Dr. Bradbury agreed to take the program back to Los Alamos for discussion of possible means of implementation.

On 29 September 1947 an estimate of the equipment and personnel which would be needed to implement the program on gamma radiation measurements was prepared by Dr. Scoville. This was discussed with Colonel Cooney and with Captain Russell. A meeting was held about 1 October attended by Dr. Froman, Colonel Cooney, Dr. Clark, Dr. Scoville, Dr.

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Francis Shonka, of the University of Chicago, and Dr. Alvin C. Graves, of the AEC, Los Alamos. It was agreed that the Radiological Safety Group under Colonel Cooney would measure the gamma radiation versus distance. It was proposed that Dr. Shonka organize a group to measure the gamma-ray spectrum which was of particular interest to the scientists at Los Alamos. Although the AEC expressed little interest in additional projects, the Scientific Director agreed to consider these particular projects provided the AFSWP could furnish necessary personnel to carry them out.

At Colonel Cooney's suggestion the AFSWP therefore took steps to contact Dr. Lauriston Taylor, National Bureau of Standards to see if he would undertake the measurement of the gamma intensity versus time. A meeting was held with Dr. Taylor, Dr. Andrews, Dr. Graves, Colonel Cooney and Dr. Scoville to discuss this project on the following day. Dr. Taylor agreed to look into the possibilities and submit a program as soon as possible. Attempts were also made to have some of the other projects carried out by various service groups. On 14 October 1947 Dr. Taylor submitted a suggested method of measuring the gamma intensity versus time. Unfortunately Dr. Taylor did not have available sufficient information as to the intensities to be measured so that the problem appeared more difficult than was warranted.

On 17 October 1947 Dr. Taylor's proposal was forwarded to Dr. Froman with a revised program for all nuclear radiation measurements. This outline included methods of carrying out the various projects in some detail. Because of the interest in the importance of the thermal radiation from a medical viewpoint a project on its measurement by means of

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heat sensitive papers, to be supplied by Dr. William Penny, British Ministry of Supply, was included.

On 21 October 1947 Dr. Froman commented on the nuclear radiation projects, approving some of these and disapproving others. Since it was felt that several of these projects were of vital importance to the military services a memorandum to the Scientific Director was prepared on 6 November 1947 requesting reconsideration of some of the disapproved items. On the basis of new information on the intensities involved, Dr. Taylor had indicated that the measurement of the gamma radiation versus time might be feasible with a micro-second time resolution. Although Dr. Graves expressed interest in this measurement, it was decided that sufficient time was not available to have the work completed by 1 January, and therefore the project was abandoned. It was suggested that Dr. Taylor draw up a detailed program for developing equipment for this purpose in the event that such measurements might be desirable in the future. Dr. Graves did agree to Los Alamos supplying samples of neutron detectors for measurement of the neutron flux within dug-outs. On the basis of the program of 17 October and Dr. Froman's comments, plans were drawn up for the final program of measurements to be carried out by the Radiological Safety Section.

Collective Protector and Cascade Impactor Projects.

After a number of informal talks among Colonel Charles Loucks, of the Research and Engineering Division, Chemical Corps, US Army, Mr. Lanier and Mr. Benjamin of the Chemical Corps, and Dr. Scoville of the AFSWP a request was made on 7 November 1947 for measuring particle size of cloud

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material. This equipment was manufactured according to the model designed by Dr. Harold Hodge, University of Rochester, with adaptations to make it satisfactory for use under conditions of the forthcoming tests. In addition, as a result of conversation with the Corps of Engineers and Chemical Corps representatives, it was considered advisable to include collective protectors in the larger Corps of Engineers' dug-outs. Mr. Bernard Siegel of the Chemical Corps, Edgewood Arsenal, was given responsibility for this collective protector program, and it was considered desirable that he also take over the cascade impactor project at Eniwetok. In the meantime Mr. Lanier and others at Edgewood proceeded with the manufacture and calibration of the cascade impactors.

Aerial Crater Survey.

On 27 October 1947 the Bureau of Aeronautics requested approval of a project to measure the contamination of the crater by means of aerial survey. This was initially turned down as being impractical, but after discussions among Commander Bliss, BuAer, Colonel Cooney, Captain Russell, and Dr. Scoville it was agreed that such a survey could be made and would be desirable in the interests of radiological safety. This experiment was therefore incorporated in the projects assigned to the Radiological Safety Group. Arrangements were made to obtain a C-47 on ZERO day and a helicopter on later days for use on this project. This project was of special interest to Lt. Comdr. Elmer R. King, MC, USN, of the Bureau of Medicine and Surgery, who had been largely instrumental in the planning of this experiment and who would play the principle role in executing it.

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Gamma Radiation Exposure.

One of the most important projects under the cognizance of Task Group 7.6 was the measurement of gamma radiation in the open and in shielded positions. The only feasible method of making these measurements on a large scale was by means of film badges. These had been used with considerable success at Bikini by Dr. Dessauer, but it was realized that the badge in use at that time was not completely satisfactory since certain gaps in the range of dosage covered existed. Dr. Dessauer was consulted on the gamma radiation measurements early in November and it was agreed to request Eastman Kodak to furnish information on emulsion which might cover the desired range satisfactorily. The AEC which was handling the procurement of this material was requested to obtain this information from Kodak in order that procurement could be initiated as rapidly as possible. Finally in December the desired information was obtained on the emulsions which might be used and an order for four thousand badges was initiated. At this time Dr. Taylor was requested by the AFSWP to carry out the development of the film badges used during the operation and a transfer of funds to the Bureau of Standards was arranged. On December 15 the AFSWP was informed by Major Dauer that Kodak was having difficulty in producing the films and a meeting was arranged in Rochester at which Dr. Taylor, Dr. Andrews, Mr. Dahl, Lt. Col. Houghton, and Dr. Scoville discussed the problem with representatives of the University of Rochester and Eastman Kodak. A complete description of the films desired was given Kodak at that time and delivery was promised shortly on the initial part of this order with complete

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delivery by 1 February 1948. Two weeks later Kodak reported that they were unable to supply the type of packaging desired and recommended a choice of two other coatings. A second choice was therefore given Kodak but two weeks later they replied that films with this type of packaging could not be supplied until 1 April 1948. Finally the third coating, an aluminum foil, was ordered and delivery was obtained by air at Long Beach on 15 February 1948. The delivered badges were by no means satisfactory since they covered twice the required area but nevertheless they were usable.

Biological Measurements.

In November when the Bureau of Medicine and Surgery was informed of the forthcoming tests, Captain Rupert H. Draeger, MC, USN, at the Naval Medical Research Institute prepared a preliminary program to carry out certain experiments which were considered desirable from a medical point of view. Previous experiments with the animals exposed at Bikini and in the laboratory had indicated the desirability of obtaining information on the physiological changes occurring in animals exposed to extremely high radiation. Because of the impossibility of obtaining high enough intensities in the laboratory, experiments of this nature could only be carried out with the gamma radiation emitted at the time of detonation of an atomic bomb. Captain Draeger first suggested exposing small numbers of animals during the forthcoming tests, but this was considered impractical by the AEC, the Joint Test Proof Committee, and Dr. Froman and was turned down. A number of meetings were held regarding such tests with Dr. Shields Warren, Dr. Froman, Admiral Parsons, Colonel Cooney,

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Captain Draeger and others. Finally it was decided to limit the experiments in the SANDSTONE operation to the testing of animal containers which might be used in any future tests.

The Bureau of Ships was consulted on possible design of containers which might be used for this purpose and on about 1 January 1948 drawings were prepared. Originally it had been planned to place the containers on land and withdraw them by means of cable after the shots. Later it was decided to include two chambers placed on rafts off shore from the ZERO Island. It was considered that the rafts might be more satisfactory because of the cooling action of the water and the greater facility offered for removing the animals rapidly after the shot. Arrangements were made for the construction of four test animal chambers, two for land and two on rafts, by the radiation laboratory at Hunter's Point. These were manufactured and shipped to Long Beach for transportation to Eniwetok on the CVE by 15 February 1948.

In addition to the test animal containers Captain Draeger proposed to continue the studies on exposure of biological materials which had proved so interesting following Bikini. A wide variety of samples of assorted biologicals were obtained from the California Institute of Technology, Department of Agriculture, Naval Medical Research Institute, and Chemical Corps, U S Army. These were carefully packaged and shipped by air courier to go aboard the CVE by 15 February 1948.

A third project was initiated by Captain Draeger to measure the thermal sensitivity of various textiles, paints and metals. About 15

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January 1948 Captain Drseger obtained the services of Commander Rudolph M. Langer of BuShips to assist on the organization and planning of this project. Commander Langer arranged to procure the necessary materials and to have them adequately calibrated at the Naval Shipyard Materiel Laboratory, Brooklyn, New York. This laboratory was already carrying out an extensive program to study the heat sensitivity of certain coatings for use on Naval Materiel. Arrangements were made through Commander Edmund J. Hoffman, USN, of the BuShips to use the same racks for exposing the plates that were to be used for the samples being exposed by the Bureau of Ships.

Gamma Radiation Shielding.

On 10 October 1947 the BuShips was advised that tests would be conducted by the Atomic Energy Commission which would measure all the physical phenomena associated with the detonation of an atomic weapon. It was further learned that the armed services would lend logistical support and would be permitted to make additional observations provided they could be accomplished without interference with the AEC basic tests and without materially increasing the logistical support required. At this time it was understood that a rather complete gamma-ray shielding program proposed by the AFSWP was included in the scientific program.

Accordingly, on 13 October BuShips submitted a letter to the Joint Proof Test Committee outlining its proposals for tests to be conducted. In this letter it was requested that the Bureau of Ships be furnished a report on the transmission of gamma rays through various shielding media. At a conference attended by Dr. Froman, Captain Russell of the AEC, and

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Captain Maxwell, USN, Commander Hoffman, and Mr. J. J. Kearns of the Bureau of Ships it was learned that the shielding experiment proposed by the AFSWP had been rejected as there was some discussion as to its potential value and the magnitude of the undertaking.

Discussions were then held with representatives of the Bureau of Yards and Docks, Chief of Engineers, U. S. Army, and Dr. Scoville of the AFSWP. All were very much interested in the project and thought it of considerable potential value. It was also believed that such a project would neither interfere with the main objectives of the operation nor unduly increase the logistical requirements for its conduct. On 20 October the Bureau received official correspondence from the Chief of Naval Operations directing that proposals for projects be submitted as soon as practicable. On 4 November a complete proposal was submitted to the Office of Lt. General Hull embodying essential features of the gamma-ray shielding test and it was suggested that it be coordinated with the radiological safety section work. Colonel Cooney concurred in the proposal. It was also proposed that Commander Hoffman and Lt E. C. Vicars, USN, be ordered to the Task Force to assist in the field work involved. These proposals were approved in a conference held on 6 November with Commander Hooper, USN, Dr. Froman and Commander Hoffman attending. This was later confirmed by a memorandum from the Office of Lt. General Hull in the latter part of November. Logistical requirements were then submitted and procurement of necessary materials was initiated on 8 December 1947. Originally plans were made to utilize structures placed on the test site by the Chief of Engineers, U. S. Army, the Bureau

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of Yards and Docks, and the AEC as specimens of shielding. These were eventually considered too complicated however and it was proposed that a number of plain steel shields made of 1 inch steel plates, 1 and 2 feet square, capable of being built up by bolting together into any desired thickness be used. It was also requested that concrete slabs, 3 inches in thickness be manufactured at the test site. In addition a quantity of angle iron was procured to be used in mounting these sample shields. Assembly of the material was made at San Francisco, Naval Shipyard under the direction of Lt. Vicars. This material was then delivered to Terminal Island for transport to the test site.

The film methods of measuring the amount of gamma radiation was selected as being the most practicable for the purpose of the test. It was decided that the film badges for all gamma measurements be procured by the AFSWP. Dr. Lavriston S. Taylor of the U. S. Bureau of Standards was placed under contract by the AFSWP to calibrate and read film badges for all gamma radiation readings.

Decontamination and Heat Sensitivity Studies.

The problems associated with handling and disposing of radioactive materials resulting from atomic bomb bursts had been one of great concern to the Navy for the previous 15 months as a result of Operation CROSSROADS. The Bureau of Ships had been assigned the responsibility for development of ship decontamination measures shortly after Operation CROSSROADS.

A new project was officially submitted by the Bureau of Ships to the Joint Proof Test Committee on 13 October 1947. At a conference held

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shortly thereafter between Bureau representatives and representatives of the AEC the project was recommended for approval. This project was designed to provide additional information as to the contaminability and relative ease of decontamination of a wide variety of materials which could conceivably be used as protective coatings on Naval equipment and structures.

At this conference it was pointed out that an effort would be made to prevent any excessive contamination such as resulted from Operation CROSSROADS. The Bureau emphasized that the project required no additional personnel, and a minimum of logistical support. Although no considerable contamination was expected, this could not be predicted with certainty and it seemed an opportunity to gain some valuable information.

This test would also provide information concerning the behavior of the various particular coatings when subjected to the radiation spectrum produced by the weapon. Such a test could not be duplicated with any degree of certainty under laboratory conditions.

Approval of the project was confirmed by memorandum to the Bureau of Ships from the Office of Lt. General Hull in early December. Procurement of samples of materials was then initiated. Previously a carefully controlled contamination and decontamination project at the Naval Radiation Laboratory had been authorized to survey a list of some sixty basic materials initially, which provided a tailormade list for selection of sample materials for the test.

The materials comprising the test panels consisted principally of about 30 synthetic plastics, 15 types of metal finishes, and 7 rubber

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samples. The plastics were prepared by the New York Naval Materiel Laboratory, the metal samples by the Naval Experimental Station, Annapolis, Md., and the rubber samples by the Rubber Laboratory at Mare Island Naval Shipyard. Suitable racks for mounting these materials in the field were ordered manufactured by the San Francisco Naval Shipyard under the direction of Lt. Vicars. In addition a complete list of tools required to erect the racks in the field was compiled. All material was crated and sent to Terminal Island where it was placed aboard the USS BAIROKO for transport to the test site.

Test of Crystal Dosimeters.

One of the most urgent defensive problems presented by the possibility of atomic warfare is that of being able to determine quickly and with a fair degree of accuracy the amount of radiation exposure of casualties. At a time when medical talent, facilities and materials may be extremely limited in availability it will be highly desirable to provide treatment on a priority basis to those individuals who have a reasonable chance to recover. It is logical to assume that at some future date a beneficial treatment will be developed. The first step in any rescue work would then be the segregation of personnel with potentialities for recovery from those who have obviously received a lethal dose. This indicates the necessity of every individual who may be subjected to such an attack being provided with a total radiation dosage indicating device which would cover a range of from about 200 to 1000 roentgens. Additional desirable features of such devices would be that they should be light, cheap, require no up-keep and be capable of being read easily by relatively

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inexperienced personnel and with a minimum of auxiliary equipment.

In the latter part of 1947 Dr. Herbert J. Friedman of the Naval Research Laboratory published a report on the coloration by X-rays of crystals of several compositions. This method seemed to offer possibilities of fulfilling the need outlined above. Although this work was in the most preliminary phases of development it seemed advisable to request that a project be proposed to test this method of measuring radiation dosage. Therefore, the project was submitted and approved along with other Bureau of Ships projects.

When approval was received steps were taken to obtain suitable crystals for the purpose. Dr. Friedman was contacted though security considerations did not permit disclosure of the immediate purpose for which the crystals were desired, a tentative promise of about one hundred crystals was received.

The crystals which had been tested previous to this project were comparatively bright in color. It was believed that if sufficiently large crystals were grown, adequate coloration could be produced for visual checking of doses. These materials are subject to fading when exposed to ultra-violet light, therefore it was necessary to package the crystals in a small aluminum tube. Because of the limited time available no calibration was feasible prior to departure from Washington.

The following materials are included for test in this project; sodium chloride, lithium fluoride, potassium chloride, and potassium bromide. The crystals are approximately $\frac{1}{2}$ inch square and 3 inches long. In their natural state they are clear and colorless but upon exposure to radiation they absorb various bands of the spectra, giving the

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appearance of color. Delivery of these materials was made to the USS BAIROKO for transport to the test site. On the voyage to the test site it was planned to attempt calibration by exposure to the radium source available.

Operations Plans for Technical Measurements.

When the first draft of the Scientific Director's Operation Plan was received, Task Group 7.6 prepared a plan for carrying out the technical measurements assigned to it. A draft of this plan was submitted to the Scientific Director on 20 November and used as a basis for future planning. Much of the information in this plan was incorporated by the Scientific Director in the over-all operations plan for the Task Force. Frequent coordination was required with the other scientific groups, with J-3, and with those responsible for organizing the air operations. In January a procedure for a flight plan for use in the C-47 aerial survey operation was prepared in coordination with Colonel Shephard, Task Group 7.4. At the end of January a final draft of the operations required for the technical measurements unit was prepared and concurred in for the most part by the Test and Scientific Directors.

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Appendix A to
Operational Report
Phases A and B

HEADQUARTERS
TASK GROUP 7.6

LOGISTICAL DATA

8 Oct. 47: 10,000 booties (made according to Oak Ridge special design) requested this date.

9 Oct. 47: 10,000 personnel film badges, 1,000 casualty film badges and two Ansco Densitometers requisitioned.

9 Oct. 47: Memorandum, DCC/3, requested procurement of the following materials:

- a. 600 Army field caps
- b. 4,000 cotton gloves
- c. 500 pairs Army field shoes
- d. 1,000 pairs cotton sox
- e. 500 assault masks (M5-11-7)
- f. 50 leak-proof masks complete w/hoods, face plates and M-11 cannisters
- g. 6 pairs Navy 7X50 binoculars
- h. 50 Navy wrist watches
- i. 600 suits, Navy green, pants and shirts

10 Oct. 47: DCC/4 requested 5,000 neutral density goggles stored in AEC warehouse, Oakland, California, be set aside for this operation.

13 Oct. 47: Memorandum to Major DAUER (AEC), indicated some changes in

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the number of film badges to be procured by the AEC.

- a. Personnel film badges with ranges 0-10r using type A and type K film should have a lead cross shield. It was noted that the Hanford plant was using a DuPont badge which had approximately this range.
- b. In the casualty badges of high range it was requested that Cine positive 5202 be used in place of Kodak 6567.

15 Oct. 47: Memorandum to Major DAUER (AEC) requested procurement of equipment, tools, instruments, etc., for the counting and repair laboratories. Primary materials were as follows:

ITEM	QUANTITY	UNIT PRICE
a. Scaling circuits, scale of 256, IDL Model 161	2	\$305.00
b. Lead chambers for Eck and Krebs beta counter tubes	2	
c. Counting rate meters, General Radio 1500A	2	\$500.00
d. Esterline-Angus, 5ma recorders	2	\$500.00
e. Balance, capable of weighing 1 milligram w/magnetic dampening	1	
f. 5 inch cathode ray oscilloscope similar or equal to DuPont 208B	1	\$285.00
g. Circuit analyzers, tube testers, etc.		
h. Tools, wire, friction tape, sponge rubber, bees-wax, spaghetti tube sleeving, etc.		

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16 Oct. 47: Memorandum to J-4, DCC/7, requested the following:

ITEM	QUANTITY	UNIT PRICE
a. Stop-watch, 60 second sweep w/30 minute accumulative	4	\$23.50
b. Stop-watch, 60 second sweep w/30 minute accumulative w/luminous dial	1	\$25.00
c. Flashlight, 2 cell, water-proof	36	\$ 2.00
d. Battle lanterns	6	\$ 6.00

This memorandum further requested that the number of binoculars requested in the memorandum of 9 October be increased from 6 to 12.

17 Oct. 47: Memorandum to Major DAUER (AEC), DCC/9, requested the following items:

a. Filter queen w/spare filter paper	6
b. Nuclear track plates, 2" x 10", Eastman Kodak	120
c. Microscope, transmission type for odd powers (no oil emersion required)	1

27 Oct. 47: Memorandum to Major DAUER (AEC) requested photographic materials to cover all film badge work.

30 Oct. 47: Memorandum to Major DAUER. DAUER objected to the AEC obtaining chemicals, glassware, solution, etc., as requested in DCC/10 so that request was modified as follows:

a. GE X-ray solution tanks, 10 gal. capacity	3
b. GE X-ray dental film hangers for 16 films	24
c. GE X-ray film drier, model D	1

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- d. Platform balance w/pans capable of weighing kgs., complete w/set of weights up to 500 gms.

30 Oct. 47: Memorandum for J-4, DCC/12, requested photographic chemicals, glassware, thermometers, clocks, buckets, etc., be obtained. In addition forty dozen 1-pint capacity wide mouth glass bottles with plastic screw tops were requested. These bottles would be used as specimen containers.

30 Oct. 47: Memorandum for J-4, DCC/13, requested 104 aiming posts be obtained from Army Ordnance stock. These posts requested by Major STONE to be used as reference points on the ZERO Island.


7 Nov. 47: Memorandum for Major DAUER (AEC), DCC/14, gave shipping information for the AEC materials being obtained for the Radiological Safety Group. All materials requested shipped to the U.S. Naval Shipyard, Terminal Island, Long Beach, California.

13 Nov. 47: Memorandum for J-4, DCC/17, requested the following items:

- | | |
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| a. Range finder, M-9 w/tripod | 2 |
| b. Glasses, flying, sun, rose smoke (USAF) | 80 |
| c. Helmet, cloth covered (USMC) | 40 |
| d. Helmet, liners (USMC) | 40 |
| e. Boot, rubber, hip (QMC) | 144 |
| f. Other misc. materials | |

19 Nov. 47: Memorandum for Major DAUER (AEC), DCC/18, approved the substitution of 2 Weston densitometers for the previously requested Ansco-Sweet densitometers. One of these instruments was later delivered to Lt. Comdr. Campbell for examination by Dr. Andrews as to its resolving power.

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 25 Nov. 47: Memorandum for J-4, DCC/19 mod 1, requested office desks, typewriter desks, chairs and drafting stools for use in the instrument repair laboratory. Four 3-combination lock 4-drawer filing cabinets were requested for disposition as follows:

a. Air Department office	2
b. Squadron office	1
c. Instrument repair laboratory	1

One Kardex filing cabinet, to hold at least 1,200 5" x 8" cards was ordered. Four typewriters were requested at this time and this number was increased to 8 on 8 February 1948. This memorandum also requested a great assortment of office supplies including among other things, a mimeograph machine.

26 Nov. 47: Memorandum for J-4, DCC/20. 19 October 47 memorandum covering clothing requirements for TG 7.6 was amended as follows:

ITEM	FROM	TO
a. Shoes, Army	600 pr	1,000 pr
b. Gloves, Army	4,000 pr	6,000 pr
c. Suits (Navy pants and shirts)	600 ea	1,000 ea

2 Dec. 47: Memorandum for J-4, DCC/22. requested 20 portable RBA gas masks.

8 Dec. 47: Memorandum for J-4, DCC/24, requested equipment and materials to cover the photographic work involved with nuclear track plates. In addition, 30 Army canvas field bags were requested.

8 Dec. 47: Memorandum for Major DAUER (AEC), DCC/26. This memorandum gave complete information on the microscope and accessories required for the work involving alpha plates.

8 Dec. 47: Memorandum for Major DAUER (AEC), DCC/27, requested the following items be procured from the Radiation Laboratories, Chicago, Illinois:

- a. Scott type mica window counter MK6 Model 1
complete w/lucite holder and 100 sample pans 2 assemblies
- b. MK5 Model 1, aluminum sample pans 100
- c. MK6 Model 2, pressure-seal type mica window
counter w/window thickness approx. 2.5 mg per
sq cm w/lucite holder and 100 sample pans 1 assembly

14 Dec. 47: Memorandum to J-4, DCC/33. It is requested that the following radium standards be procured from the Bureau of Ships:

- a. 25 mg.
- b. 50 mg.
- c. 100 mg.
- d. 250 mg.

All samples to be contained in 0.5 mm of platinum or equivalent.

16 Dec. 47: Memorandum to J-4, DCC/28, requested special shop work to manufacture the following items:

- a. Water sampler 25 assemblies
- b. Specimen holder 12 assemblies

Rough drawings of both items, along with one model water sampler, accompanied the memorandum.

5 Jan. 48: Memorandum for Major DAUER, DCC/34. As the result of technical measurements being conducted by the Chemical Corps, the following

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changes were made in the request of 15 October 47:

- a. Increase the number of General Radio counting rate meters, type 1500A, from 2 to 4.
- b. Increase the number of beta counting tubes and the number of gamma counting tubes for the above instrument from 3 to 6.
- c. Increase the number of Esterline-Angus 5ma recorders from 2 to 4.

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TASK GROUP 7.6 OPERATIONAL REPORT

PHASE C

CHAPTER 5

EMBARKATION AND VOYAGE TO TEST SITE

Movement to Port of Embarkation.

On 14 February 1948 all offices of the Radiological Safety Group in Washington, D. C., with the exception of that of the Rear Echelon under the command of Commander Fonick were closed.

Colonel Cooney departed for Pearl Harbor to join the Forward Echelon, Headquarters, JTF-7 (Main) Staff at Fort Shafter, T.H. Commander Winant, Colonel Isbell, Commander Andrews, Lt. Colonel Houghton, Commander Fonick, Major Stone, and Dr. Scoville proceeded to Los Alamos, New Mexico to attend an AFSWP conference scheduled for 17 February. From there this group with the exception of Commander Fonick continued on to Terminal Island, Long Beach, California, the embarkation site for Task Group 7.6. At this time Commander Fonick returned to Washington, D. C. to carry out his duties as Commander, Rear Echelon. Meanwhile the balance of the staff personnel had departed from Washington, D. C. to proceed directly to the embarkation point.

During the period from 15 February to 28 February 1948, staff and non-staff personnel of Task Group 7.6 reported to Terminal Island from various stations throughout the country. The majority of these personnel reported by 18 February, and since quartering facilities at the Terminal Island Receiving Station were extremely overcrowded, it was decided to move personnel aboard the U.S.S. BAIROKO (CVE-115) which was

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then at that port. This was done on 20 February at 1300 hours. A few officers and men were left ashore to expedite the supply and logistical work yet to be accomplished prior to the scheduled sailing date of 29 February.

On 21 February the BAIROKO departed Terminal Island with the bulk of Task Group 7.6 personnel aboard, arriving at San Diego the following day. From the 22nd to the 26th of February, fuel, aviation gasoline and aircraft were loaded aboard, and the ship departed on the morning of 26 February, arriving back at Terminal Island late that afternoon. The remainder of equipment and supplies were now loaded aboard and the rest of the Task Group personnel embarked.

Activities Enroute to Test Site.

On 29 February 1948 the BAIROKO departed from Long Beach with the Task Force convoy bound for Pearl Harbor, thence to Eniwetok.

From the initial date of embarkation indoctrination of personnel on the mission of the Task Group was directed. Commander Winant gave two orientation lectures in which all aspects of the mission were covered and it was pointed out that due to the variety of services and civilian personnel represented a coordination of effort must be emphasized. Immediately upon sailing for Pearl Harbor detailed operational planning and a comprehensive study of expected problems commenced.

Special Orders Number 1, Task Group 7.6, dated 28 February 1948, were published, establishing an Air Monitor Unit (Task Unit 7.6.1) under the command of Colonel Isbell which would be located at Kwajalein.

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The unit would operate from this base on air monitoring missions in conjunction with the atomic bomb tests. Special Orders Number 2, Task Group 7.6, dated 29 February 1948 established additional task units into which the task group was divided for operational purposes. Task Group 7.6 was now departmentalized into Task Units as follows:

<u>T.U. No.</u>	<u>DESIGNATION</u>	<u>COMMANDED OR DIRECTED BY</u>
7.6.1	Air Monitor Unit	Col. R. N. ISBELL, USAF
7.6.2	Staff Unit	Lt. Col. K. H. HOUGHTON, USA
7.6.3	Operations Unit	Maj. W. W. STONE, Jr., USA
7.6.4	Laboratory Unit	Cdr. H. L. ANDREWS, USPHS
7.6.5	Radiological Records Unit	Maj. J. T. BRENNAN, USA
7.6.6	Technical Meas- urements Unit	Dr. H. SCOVILLE, Jr., AFSWP
7.6.7	Monitor Unit	Cdr. B. H. SMITH, Jr., USN
7.6.8	Advisory Unit	Dr. J. F. NOLAN, AEC
7.6.9	Rear Echelon Unit	Cdr. T. R. FONICK, USN

At this time Captain William F. Bolen, USA was designated as Historical Officer, Task Group 7.6 assisted by Chief Yeoman Cameron W. Croasdell.

While enroute to Pearl Harbor, Lt. Commander Jacob J. Vandergrift, Jr., USN, the School Director at the Radiological Safety School, Treasure Island, California, was designated as the School Officer for Task Group 7.6, and he outlined a schedule of classes to be conducted while enroute to the test site. These classes began on 1 March and were conducted daily in the Forward Ready Room of the ship. The school day was divided into four periods. An outline of the subject matter

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covered during the first week at sea, showing respective lecturers is as follows:

<u>SUBJECT</u>	<u>LECTURER</u>
1. General Nature of Operations	Dr. Scoville
2. Phenomenology	
3. Task Force Organization	Cdr. Winant
4. Radiological Safety Plan	
5. Task Group Operation Plan	
6. Instrumentation	Cdr. Andrews
7. Types of Instruments	
8. Calibration of Instruments	
9. Cloud Travel	Maj. Stone
10. Evacuation and Reentry	
11. Operations	
12. Air Operations	Col. Isbell
13. Instructions to Monitors	Cdr. Smith
14. Security	Capt. W. E. Hanley, J-2 Section, JTF-7

The outline of subject matter covered during the second week at sea, showing respective lecturers is as follows:

<u>SUBJECT</u>	<u>LECTURER</u>
1. Instructions to Monitors	Cdr. Winant
2. Scientific Operations I	Maj. Stone
3. Scientific Operations II	Maj. Sheppard
4. Electronics I (Electricity)	Cdr. Andrews
5. Electronics II (Vacuum tubes)	Mr. Menzer
6. Electronics III (Details of GM Survey instrument)	Cdr. Andrews
7. Communications	Capt. Helgestad

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8. Medical Aspects I	Dr. Morton
9. Medical Aspects II	Maj. McDonnel
10. Measuring Beta Activities	Cdr. Andrews
11. Gamma Radiation	Dr. Scoville
12. Protective Devices	Mr. Seigel
13. Gas Masks and Hoods	Maj. Cook and Mr. Seigel
14. Safety Precautions	Lt. Col. Houghton

In addition to the scheduled lectures a daily afternoon period was established for the calibration of the various instruments to be utilized in monitoring operations by use of radium sources of known values.

Physical conditioning was deemed advisable, particularly in the case of monitors who would be involved in somewhat strenuous activities in the forthcoming operations. A period of physical conditioning was scheduled each afternoon.

On 7 March 1948 the Task Group arrived with the rest of the Task Force convoy at Pearl Harbor and departed the following day for Eniwetok Atoll.

During this period a photographic unit took both still and motion pictures of the various activities of the Task Group aboard ship. Maj. G. M. McDonnel, MC, USA, a member of Task Group 7.6 was designated as Liaison Officer with the photographic unit to assist in coordinating their work with the scheduled operations of the Task Group.

A complex communication system involving the use of many types of both Army and Navy equipment was employed in the radiological safety net.

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Captain James E. Helgestad, USA, coordinated this work for Task Group 7.6 using existing installations supplemented by various types of portable radio equipment. He also devised the coding and cipher systems to be used by Task Group 7.6 in Operation SANDSTONE. Lt. (jg) David L. Flynn, USN, actively assisted this work and also organized the Radar Tracking system for the Lagoon Boat Patrol which would supply radiological data for the reentry of ships into the lagoon after the shots.

A considerable portion of the time and effort of the Task Group staff during the cruise from Terminal Island to Eniwetok was devoted to the development of an Operation Plan. ANNEX E, the Operations Annex, was largely devoted to an initial analysis of the radiological safety requirements established by the Scientific Operating Plan (SCOP) of Task Group 7.1. At a later date, it was found advisable to replace this annex with a more flexible "Operations Schedule". ANNEX G, the Technical Measurements Annex, contained a description of 14 of the Service Tests being conducted at SANDSTONE. It will be noted that these tests are protective in nature. Many of the tests will produce long term results in the development of shielding, biological studies, etc., and can appropriately be classed as Radiological Defense Projects. Other projects, such as analysis of water, dirt and dust samples and crater surveys were primarily pointed toward the short term objective of promoting Radiological Safety within the Task Force. In general it will be difficult to dissociate RadSafe and RadDef projects. Nevertheless, the significance of the RadSafe projects to the successful

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accomplishment of the mission should be clearly recognized. Considerable latitude should be allowed the Radiological Safety Group in planning and conducting RadSafe projects in all similar operations.

By the time the Task Force convoy had arrived at Eniwetok, 16 March 1948, the final draft of Task Group 7.6 Operational Plan was completed and ready for distribution.

In order to amplify the purpot of policy as set forth in the operational plan itself, a series of letters on radiological safety was started at this time. As of 16 March, three of these RadSafe letters had been distributed to Task Group Commanders, covering subjects listed below (Copies attached as appendices "C", "D", and "E", respectively):

RADSAFE NUMBER

SUBJECT

ONE

Radiological Safety - General

TWO

Radiological Safety - Gas Masks

THREE

Radiological Safety - Procedures
for Handling Contaminated
Material.

Numerous discussions had been held during this phase among representatives from Oak Ridge, Los Alamos, Hanford and other laboratories concerning the establishment of standards and procedures for the control of contaminated materials and personnel. As a result of these discussions an agreement on a workable plan was reached and RADSAFE THREE was published to disseminate this information to the Task Force.

Logistics.

Prior to this phase of operations virtually all materiel was

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either on hand at Terminal Island or indications of delivery were known. The only major exceptions to this were orders for gas masks, microscope, dark field condenser, and a stage micrometer. The Washington Office had been notified of the status of these orders and final delivery was made prior to the ship's departure.

Early in February a shipment of four thousand goggles was received by Task Group 7.6 supply representative and his staff at Terminal Island from an AEC warehouse in Oakland. These goggles were to be used by members of the Task Force as a safeguard against light intensities of atomic explosions during forthcoming operations. For the most part they were second-hand goggles, having been stored since the time of Bikini tests, and were in poor condition. Various tapes which had been used to cover the ventilation holes had deteriorated, and entire lots of goggles were found adhered together. Four days work on the part of Task Group 7.6 crew at Terminal Island was required to put the goggles in usable condition.

On 19 February the loading of material aboard the BAIROKO began but had to be suspended during the week 21 February to 27 February when the CVE made a trip to San Diego. Loading was resumed upon return of the BAIROKO to Long Beach and completed on 28 February.

During the voyage to Eniwetok clothing supplies were stored in a number of compartments throughout the ship. The initial issue of monitor's clothing was made from the after aviation storeroom on 12 March. This issue consisted of 1 pair army field shoes, 6 pair khaki socks, 1 suit of navy green trousers and shirt, 1 field cap, 3 pair

booties (canvas shoe covers), 1 pair work gloves, 1 field bag, 1 notebook, 1 canteen, 1 helmet liner or 1 sun helmet, 1 pair dark goggles, 1 pair sun glasses, 1 wrist watch, and 1 assault gas mask.

CHAPTER 6

PROJECT DEVELOPMENTS

Laboratory.

During the voyage to the test site the various types of instruments were unpacked and inspected. Circuit checks were performed and replacement of parts and batteries made when need of such adjustments was indicated. Work on setting up the laboratory continued so that equipment could operate at greatest efficiency when operations actually started.

Daily calibration checks were run on as many instruments as possible until a series of at least five checks had been accomplished on all instruments.

On 2 March 1948, Commander Andrews requested through Commander Fonick of Rear Echelon that Dr. L. F. Curtis of the Bureau of Standards make immediate shipment of Cobalt 60 solution in flame-sealed containers to be used as standards for measuring radiation. These were needed for replacement of similar standards which had been broken in transit.

It was found that when reading pocket dosimeters they should never be pointed directly at the sun since the optical system acts as a magnifying glass and the graduated scale, being made of a photographic emulsion, is easily ignited and rendered useless.

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Radiological Records.

On 3 March, Lt. Colonel Houghton turned over the responsibility for the medical records to Major J. T. Brennan, together with the following: 400 physical examination and laboratory test reports, blank forms for monitors data sheets, individual exposure cards, and physical examination certificates. Major Brennan set up a Kardex file system containing an individual card for each member of the Task Force.

During the early part of March certain personnel of Task Group 7.6 received exposures incident to instrument calibration work. These exposures were detected on film badges and dosimeters, and were recorded in the Kardex file. This latter procedure served as a dry run test of the record system.

By 15 March 300 more physical examination reports had been received. A survey of physical examination reports was begun in order to determine the status of Task Group 7.6 personnel with regard to compliance with Field Order Number 1, Annex J, paragraphs 4-a and 4-e. These sections dealt with personnel who would be working with radioactive materials or in radioactive areas and are herewith quoted:

"All such persons shall, prior to departure from the United States, receive a complete physical examination including chest X-ray, blood count, and urinalysis; and reports of such examination shall be in the hands of the Radiological Safety Officer prior to departure. Prior to final release from the Task Force, personnel shall undergo such further physical examination as the Radiological

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Safety Officer may specify. Names of all individuals who are expected to enter radioactive areas will be submitted to the Commander of Task Group 7.6 in the form of an eligibility list two weeks prior to the test. Commander Task Group 7.6 will prepare appropriate cards on all such personnel. In addition, a Control list containing the names of any persons who expect to enter a contaminated area on a specific day will be submitted to Commander Task Group 7.6 on the preceding day. Commander, Task Group 7.6 will report to the Task Force Commander with copies to Test Director and Scientific Director the names of any persons who are disqualified for such entry by reason of previous radiological exposure."

Photographic Dosimetry.

On 3 March Major Brennan took over responsibility for film badge records and administration of the photometry section. The technical aspects of photometry however were to remain under the direct supervision of Commander Andrews.

On 3 March the first calibration of personnel film badges was run, using the 48.7mg radium source and a second calibration was completed on 6 March. The films were developed and read on a Weston Densitometer, model number 877.

During the period 10 to 15 March, film badges were issued to monitors who were being exposed in connection with instrument calibration work on the Flight Deck. All these films were developed, read and the records forwarded to the Medical Records Unit for permanent filing.

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Technical Measurements.

All the technical measurements being carried out within Task Group 7.6 were placed under Task Unit 7.6.6 of which Dr. Scoville was in charge. These measurements included the large fraction of the measurements which were being carried out at the request of the armed forces. The various projects which were included under this unit are listed below, with the personnel responsible for each one:

<u>PROJECT</u>	<u>PERSONNEL</u>
Gamma Radiation vs Distance	Dr. H. Scoville, Jr., AFSWP Cdr. E. J. Hoffman, USN Dr. Lauriston Taylor
Gamma Radiation Shielding	Cdr. E. J. Hoffman, USN Lt. E. C. Vicars, USN
Residual Contamination in Crater	Cdr. H. L. Andrews, USPHS Mr. R. E. Murphy, USPHS
Air Survey of Ground Contamination	Lt. Cdr. E. R. King, USN
Exposure of Panels for Decontamination and Heat Sensitivity Studies	Cdr. E. J. Hoffman, USN Lt. E. C. Vicars, USN
Neutron Absorption	Dr. H. Scoville, Jr., AFSWP
Radioactivity in Cloud	Dr. H. Scoville, Jr., AFSWP Lt. Cdr. E. R. King, USN Lt. Col. J. J. Cody, Jr., USAF
Test of Efficiency of Field Collective Protector	Mr. B. Seigel, CmlC Cdr. H. L. Andrews, USPHS Mr. R. E. Murphy, USPHS
Particle Size of Material in Cloud	Mr. B. Seigel, CmlC Cdr. H. L. Andrews, USPHS Mr. R. E. Murphy, USPHS

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<u>PROJECT</u>	<u>PERSONNEL</u>
Thermal Radiation Papers	Dr. H. Scoville, Jr., AFSWP Cdr. R. M. Langer, USNR
Test of Direct Reading of Crystal Dosimeters	Capt. R. H. Draeger, USN (BuMed Dosimeters) Cdr. E. J. Hoffman, USN (BuShips Dosimeters)
Exposure of Biological Assay Material	Capt. R. H. Draeger, USN
Thermal Radiation Plaques	Cdr. R. M. Langer, USNR Capt. R. H. Draeger, USN
Test of Animal Containers for Suitability in Exposing Animals at Close Range	Capt. R. H. Draeger, USN

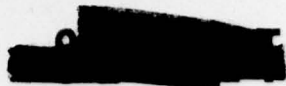

In the course of the trip to Eniwetok detailed plans were drawn up for carrying out the various projects. This involved schedules for setting up equipment on the test islands and for recovering materials subsequent to the tests. Materials for the various projects were assembled and carefully marked during the trip out so that no time would be lost on arrival. A few items which had not been received prior to departure were ordered at Pearl Harbor.

Work was started on the preparation of pre-test reports for each project. These were planned so that they could be incorporated in the final reports of the project with only minor variations. They were to include details of method of making the measurements, summary of the past work in the field and the nature of the results which it was hoped would be obtained from the projects.

The precise information to be obtained from each project and the methods in which they were to be accomplished is given in Annex "G" of

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Operational Plan 1-48, Task Group 7.6 (See Appendix "B").

Monitors.

Monitors daily attended classes and calibrated instruments during the voyage to the test site. The program was designed to enable the monitor to adapt the theoretical training received at the radiological safety schools to practical situations.

The action of a monitor in the event a group leader working in a contaminated area refused to remove his party upon being warned to do so by the monitor was discussed at a meeting held on 4 March 1948. Commander Winant ruled that the monitor, after properly notifying the party leader as to the radiological exposure condition, would leave the area after having received an exposure of 3 roentgens and report the incident immediately.

TASK GROUP 7.6 OPERATIONAL REPORT

PHASE "D"

CHAPTER 7

Preparations at the Test Site.

Upon arrival at Eniwetok on 16 March discussions of the operational plan were held aboard the MT. MC KINLEY following which preparations for forthcoming missions immediately got underway.

On 17 March Task Unit 7.6.1 (Air Monitoring Unit) departed for Kwajalein to commence operations in conjunction with Air Task Group 7.4.

Captain Draeger and Dr. Scoville, accompanied by Lt. E. C. Vicars, USN, who had arrived at Eniwetok on 5 March as advance echelon representative, visited Engebi at this time in connection with preparations for technical measurements projects. Arrangements were made with the island commander for use of certain facilities on Engebi and on 18 March seven members of the Technical Measurements Unit (TU-7.6.6) went by LCT with all their equipment to that island, setting up a base of operations for their unit ashore. A TCS radio was also sent with this party to facilitate frequent communications with the main Task Group on the BAIROKO. The organization of this shore unit proved very successful and reduced materially the time required for the pre-test preparations. Excellent facilities were available for assembling equipment and doing the necessary installations and the cooperation received from the Engineer detachment on the island was extremely helpful. The only serious difficulty encountered by this group was that of transportation. Although vehicles had been requested for the

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use of TG-7.6 prior to departure from Washington, none were available upon arrival at the island. Borrowing of vehicles from other groups ashore and the use of DUKW's for handling heavy equipment was necessary for several weeks, until a jeep was eventually procured through TG-7.1. In future operations of this nature, ample transportation facilities should be made available to the radiological safety group.

On 20 March the Task Force shifted anchorage from Eniwetok Island to Engebi Island, and TG-7.6 began a daily schedule of work in coordination with full scale Task Force preparations for the X-RAY shot.

Nightly meetings of the staff of TG-7.6 aboard the CVE, which had been regularly conducted since the date of embarkation at Long Beach, were continued. At these meetings various staff members made informal reports regarding the status of current work in their respective organizations. Current problems were discussed and plans outlined for the following day.

In accordance with JTF-7 Field Order Number 2, the TG-7.6 Withdrawal and Roll-Up Plan was submitted to Colonel Cooney for endorsement and forwarding to CJTF-7. In addition to administrative, logistics, and similar routine plans for the roll-up operation, the following recommendations were made:

1. After dissolution of JTF-7, the responsibility for coordinating the technical measurements projects with the Armed Services and the AEC be assigned to the Armed Forces Special Weapons Project in accordance with AFSWP charter.

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2. The forwarding endorsement recommended that a small radiological safety group be included in the Post-SANDSTONE Garrison, provided by the service furnishing the Garrison. It also recommended that the stock of AEC RadSafe instruments in custody of TG-7.6 be released to the Post-SANDSTONE Garrison. Minor instrument repair and photometric dosimetry should be accomplished at Kwajalein. Major instrument repair should be accomplished in the ZI.

3. Radiological Medical Records with supporting data for Medical-Legal purposes will be delivered to the Test Director for incorporation in AEC records on Z-plus-25. Copies of these records in the cases of all military personnel will be forwarded to AFSWP for the proper distribution among the Armed Services.

On 29 April 1948 a letter was forwarded by Commander, TG-7.6 to Commander, JTF-7, recommending that the following radiological safety instruments be released to the Post-SANDSTONE Garrison at Eniwetok:

- 5 GM Counters, Victoreen 263A
- 2 Ion Chambers, National Technical Laboratories MX-6
- 20 Pocket Dosimeters, Kelly Koett, 0.2r
- 2 Charging Boxes for Kelly Koett Dosimeters
- 15 Replacement GM tubes
- 10 Sets of Replacement Batteries for everything
- 1 Test Meter
- 2 Radium Buttons

Two-hundred personnel film badges, to be forwarded to the Radiological Laboratory at Hunter's Point, Naval Shipyard

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for processing after use.

A letter dated 4 May 1948 from CJTF-7 to CTG-7.6 and CTG-7.2 approved the latter recommendations above and directed that as soon as possible CTG-7.6 deliver the items mentioned to CTG-7.2 for the Supply Officer, Permanent Garrison Force, Eniwetok. It further stated that it was desired that the items of equipment as listed be included in the Table of Equipment for the Permanent Garrison and that quantities of expendable supplies as listed will be considered as authorized stock levels.

In addition to other scheduled work being carried out during this initial preparation period at the test site a special study of currents off Engebi was made. This study was conducted in order to anticipate as nearly as possible the direction and spread of any possible contamination resulting from fall-out or direct deposition by the explosion. The drift of partially submerged floating objects was also observed. Data for such a study was obtained through observations by helicopter and small boat patrols. The results of this study indicated that the currents were generally from the ENE direction and that no contamination would be expected south of a line bearing 240° T from the southern tip of Engebi. The maximum current speed was established at approximately 0.5 of a knot. The results of the subsequent lagoon survey following the X-RAY shot indicated the value of this study and bore out the accuracy of its predictions.

During a period prior to PETER-X-RAY day a pre-rehearsal survey of all scheduled missions was made. Monitors concerned made personal

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contact with leaders of the various scientific parties on the actual site of proposed operations, and familiarized themselves with the situation as presented in the field. They made inspections of all stations or installations involved in their respective missions, and conducted on-the-spot briefing of associated personnel concerned. A daily check of all RadSafe radio circuits was also made. Detailed operations schedules were compiled and monitors briefed on missions in the same manner anticipated for actual test operations.

Particular attention was given to the ZERO island RadSafe survey scheduled to start on X-plus-1 day. Since this operation involved the necessity of using a rather complicated layout of numbered stakes to be used as reference points for plotting isointensity lines, it was desirable to hold several rehearsals involving the entire survey party to insure the greatest accuracy and speed possible in accomplishing the operation. The need to expedite this mission was given special emphasis since it was considered "routine" and as such the allowable daily exposure was 100 mr.

Throughout this period of practical indoctrination monitors were briefed in detail concerning the entire RadSafe operation, and all participating personnel had gained a comprehensive picture of respective assignments as they appeared under field conditions.

The Task Group was now in readiness for the full-scale rehearsal of the Task Force X-Ray operations. This was reflected during PETER-X-RAY operations when all TG-7.6 missions were rehearsed with a minimum of difficulty.

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On 9 April a critique was held aboard the BAIROKO at which monitors reported and commented on PETER X RAY missions. A summary of the more important comments follows:

1. Radex should be broadcast to all ships.
2. The L-5 flight to clear Aoman and Runit should be repeated X-RAY day afternoon because of possible delayed fallout.
3. A RadSafe survey should be run via helicopter prior to drone tank operation.
4. Tank control helicopter over personnel parties on ZERO island seems hazardous from standpoint of dust and mechanical failure.
5. Party leaders should not preempt the duties of monitors.
6. There should be a 6x6 truck available near revetment for emergency use of disaster party on X-minus-1 morning.
7. Gas masks were badly mishandled in the rehearsal. They should be kept in carriers when not actually in use.
8. Monitor in AVR-38 is on duty as a monitor and should not have full-time duty as a radio operator.
9. It seems desirable to shield the land cable winch drum to decrease radiological exposure of the operating personnel.
10. Inadequate quartering and feeding facilities encountered on Parry Island.
11. Adequate working personnel should be assigned to parties where necessary to expedite missions.
12. Lack of physical examination reports, eligibility lists and control lists.

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These items were taken up by CTG-7.6 with appropriate Task Group Commanders following the next Task Force Conference.

On 7 April RADSAFE FIVE was published to all Task Groups, requesting that previously issued goggles for protection against blast intensities be made light-tight before use by covering ventilation holes in rubber housing. (See Appendix "G").

A supply section and issue point combined with a decontamination center was established on the port side of the BAIROKO hangar deck. It was planned that as monitors prepared to leave the ship they would report to this point and draw instruments, booties, gloves, and any other necessary equipment required for the mission. Upon completion of their mission they would come aboard at the port side and pass into a restricted zone roped off on the deck where they would be monitored for contamination, draw new clothing if needed and turn in their equipment, film badges, dosimeters and monitor report cards. This system would be an established routine and prevent personnel in contaminated clothing from going about the ship spreading radioactive contamination.

It was evident that the number of operations which required the use of monitors and the necessity of a continual check on the location of each member of TG-7.6 would require preparation of a detailed operation schedule for each day throughout test periods. In preparing this schedule it was endeavored to involve all essential movement of personnel in a coordinated manner. Each RadSafe party was given a number, its time of movement noted, names of monitors given, the type

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of transportation to be used, and a brief summary of the specific mission. A code designation was assigned each mission to facilitate communication by radio with RadOps on the BAIROKO. The priority of missions was also designated as ROUTINE or URGENT. A rough draft of this schedule was given a thorough study, and shortly before X-RAY day it was mimeographed in final form and distributed to all personnel concerned. However, by X-plus-1 day it was found necessary to schedule a number of additional missions which had not been anticipated. Finally, the program became so accelerated as a result of encountering lower radiation intensities than had been expected, that the original operations schedule became no longer applicable. Therefore it became necessary in the midst of X-RAY operations to prepare a new schedule of missions on a day to day basis. Commencing with X-plus-2, a schedule was published each night for the following day. This new abbreviated schedule gave the RadSafe party number, a brief description of the mission, names of the monitors, type and number of instruments involved, number of film badges to be provided, the time of issue and time of departure. The two latter items expedited the work of the supply section, enabling them to prepare the proper number of various types of equipment in advance for issue when scheduled. Monitor assignments were regulated in accordance with previous exposure as recorded by the Medical Records Unit.

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CHAPTER 8

TESTS

X-RAY - YOKE - ZEBRA

X-RAY Test.

During the week prior to X-RAY day final details of test installations were accomplished. The technical measurements unit distributed film badges and heat sensitive papers for recording various intensities on ZERO island at a number of structures, stakes, etc. Many different materials for exposure such as papers, woods, etc., as well as biologicals were also set out at this time.

At Eniwetok a base of operations had been established at the air strip to carry out RadSafe missions in that area. These missions involved monitoring returning drone planes, removing and disposing filter units, and obtaining accelerometer data from these aircraft, as well as monitoring crews before their return to Kwajalein. In addition to these missions at the air strip this party was to monitor the swimming beach and effect general radiological safety for the island.

Monitors were established on Ujelang and Parry Islands to effect radiological safety as well as coordinate film badge distribution and collection among personnel required to remain there throughout the operation.

Other monitors were sent aboard the various ships in the Task Force. They were to keep an accurate check on any radioactive samples brought aboard as well as effect radiological safety among personnel.

Task Unit 7.6.1, already established at Kwajalein, was ready to

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carry out air monitoring missions in conjunction with the Air Task Group operations. Also operating out of Kwajalein would be the C-47 aerial survey to determine radiation intensities and fallout at varying altitudes in the vicinity of ZERO island on the shot day.

On X-minus-3 the first of a group of monitors who would accompany various scientific parties on X-day departed for various points of rendezvous in preparation for movement to ZERO island on the morning of X-day. Also at this time Dr. Nolan, Dr. Whipple, and Captain Knowlton came aboard the BAIROKO to act as advisors on matters of radiological safety, and Lt. Commander Carr of AFSWP arrived to participate in the first test of the operation.

According to plan, all communications on X-RAY operations from RadSafe missions were directed to the MT. MC KINLEY RadSafe Center and monitored by RadOps on the BAIROKO. This provided immediate first-hand information for the Radiological Safety Officer aboard the MT. MC KINLEY. On succeeding days the plan called for communications direct to RadOps on the BAIROKO. The MT. MC KINLEY RadSafe Center also plotted daily possible fallout patterns based on weather forecasts and maintained daily surface and air RadExes (survey showing limits of expected fallout on the surface and of air contamination) for the information of the Radiological Safety Officer. Information from the cloud tracking planes for monitors of TU-7.6.1 was also plotted in this center.

On X-RAY morning the BAIROKO was anchored at an observation point approximately seventeen miles, 340° T from Engebi. At H-plus-20

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minutes a monitor departed by helicopter to monitor the area in the vicinity of the land cable winch on ZERO island and determine the feasibility of scheduled missions attempting to work in that area. He

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On Parry Island a monitor boarded the AVR-53 which departed at H-plus-10 minutes for ZERO island to stand by for air-sea rescue in the event of accident to one of the helicopters. AVR-38 also departed Parry Island at this same hour with a group of five monitors aboard who would be put ashore at ZERO island to accompany urgent missions involving recovery of samples from land cables and from the "gamma stations". One monitor in this latter group remained aboard the AVR to act as monitor for that vessel and to operate the radio until communications could be established ashore.

At about H-plus-45 minutes the BAIROKO got underway, and at a point about 5 miles from ZERO island two TG-7.6 boats, a PPB and LCVP were lowered into the water while underway. These boats, equipped with radios and radar target screens, served as the lagoon reentry patrol. With monitors and radiomen aboard they preceded reentry into the vicinity of ZERO island, monitoring water intensities and radioing the information in code to RadOps. By the use of radar tracking, RadOps plotted a continuous track of these boats on a chart overlay, marking intensities where indicated by radioed information. Later, when the BAIROKO had anchored off ZERO island, these boats continued

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with a survey of the lagoon area. On this latter mission they followed a prescribed course, and the same system of recording intensities prevailed.

One of the high priority missions on X-RAY day was that of the crater sample recovery. This party proceeded to ZERO island by LCM at H-plus-3 hours and beached near a revetment protecting the crater sample recovery tank. They were met there by Dr. Froman who had arrived on the island from Eniwetok by helicopter. The tank was guided into the crater by remote control from a helicopter to scoop out earth samples. In the event that the helicopter and its standby were unable to control the tank the LCM was prepared to act as the remote control station. The tank made two trips into the crater and returned with samples but these were not considered as having sufficiently high radiation intensities. The tank was directed into the crater for the third time but became bogged down. The most representative of the samples obtained was divided; the major part for Dr. Bowman's laboratory on Eniwetok Island and the other for the TG-7.6 laboratory aboard the BAIROKO for analysis in connection with technical measurements projects being carried out in the interest of radiological safety.

The ZERO island radiological safety survey was started on X-plus-1 day. Intensity readings were taken at various spots on the island which had been marked with numbered stakes. These intensity readings were immediately transmitted in code via radio to RadOps on the CVE where iso-intensity lines were then plotted on overlays of island charts.

On X-plus-1 numerous biological samples were collected and

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returned to the ship for further disposition. Film badges which had been placed in various spots over the island were collected and brought back for processing. At this time Commander Winant, Lt. Col. Houghton, Commander Andrews, Lt. Commander Campbell, Major Stone and Dr. Bowers made a trip to ZERO island and checked the perimeter of the crater by breaking into two parties.

On X-plus-2 day Dr. Froman, Captain Russell, Mr. Benson, and Commander Winant went ashore on ZERO island to inspect AEC equipment to determine what was salvagable.

During the week subsequent to X-RAY day many routine operations were carried out in connection with collection of data. Biological samples, film badges, photographs, and other exposed materials continued to be recovered. Dirt samples were taken from the vicinity of the personnel landing on ZERO island and water samples collected along the reef north and west of the BAIROKO berth. These were turned over to TG-7.6 laboratory for analysis.

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AEA Restricted Data

A lagoon perimeter island survey was conducted, as well as a survey of recreational beaches throughout the lagoon area.

Dust collectors were operated on all vessels and periodic checks made of ship evaporators for contamination.

By X-plus-5 the restrictions on ZERO island were reduced materially

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because of low radioactivity and absence of contamination. One monitor was posted at the personnel landing during the working day and parties were briefed as they came ashore and checked for contamination prior to leaving the island. A line was established beyond which workers and those on routine missions were not permitted to go without monitors. Two monitors acted as a roving detail. Film badges, pocket dosimeters and party monitors were provided for those who had to go beyond this line.

On X-plus-8, Major Richard I. Moss, USMC, of AFSWP joined the Task Group.

YOKE Test.

Preparations for YOKE day were carried out with greater precision than was demonstrated for the X-RAY shot. By this time all personnel concerned had a much better understanding of the problems involved and practical experience in meeting them.

Since the basic plan for YOKE operations followed the same pattern of X-RAY, RadSafe activities became virtually a repetition of those accomplished for the initial test. The major difference was in the technical measurements which were varied to conform to a different outlay of test structures.

The schedule of missions for YOKE conformed to the same type and procedure as for X-RAY, but wherever practical, personnel were reassigned from one group to another in order that they might gain broad experience in various field radiological problems.

An operations schedule for the movement of all monitors from

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Y-minus-4 through Y-plus-1 was published and distributed to all concerned. Monitors were thoroughly briefed in their particular missions.

On the afternoon of Y-minus-1, YOKE day was postponed one day. For the most part this merely involved setting back the schedule accordingly. However, it did necessitate return of certain personnel of the technical measurements unit to the LCM "Lame Duck", anchored downwind from ZERO point, to refuel generators and reset clocks on the cascade impactors. The Technical Measurements Unit also checked materials at other installations, replacing those which had become damaged by showers or long exposure to the sun.

On the morning of YOKE day the BAIROKO was anchored about 14 miles from ZERO island, and at about H-plus-30 minutes got underway. The lagoon reentry patrol boats for this operation were put in the water before the CVE got underway, preceding reentry into the ZERO area and checking intensities over the entire distance from the pre-shot anchorage to the new berth in the vicinity of ZERO island. The number of these reentry patrol boats was increased for YOKE day; four from the BAIROKO and two from the MT. MC KINLEY.

Meanwhile various other scheduled RadSafe missions followed the same pattern of operations which this report has outlined for Test X-RAY. All of these missions were accomplished successfully, and in most cases were completed ahead of schedule.

An additional mission on YOKE day was accomplished by a party of medical officers who explored islands in the immediate vicinity of the

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test site in an attempt to recover flora and fauna to be used to study the effects of the weapon upon them.

On Y-plus-1 a survey of ZERO island was completed and detailed charts showing activity found were delivered to the Scientific Director and to the Radiological Safety Officer.

The recovery of samples to be used in obtaining technical measurements data continued as did work on lagoon water surveys.

A resurvey of the ZERO island and collection of soil samples from the vicinity of blast footings was carried out on Y-plus-2. Additional crater survey operations were also completed at this time.

A survey of perimeter islands was conducted to determine the presence of any fallout or water contamination. This information was reported in detail to the RadOps where a complete report was prepared.

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On Y-plus-9, Captain Draeger and Commander Langer departed for the United States to begin work on their samples.

ZEBRA Test.

Following the same procedure as for previous tests, preparations for ZEBRA were accomplished in a manner which appreciably reflected experience.

The mission for ZEBRA involved essentially the same schedule as before. A new schedule was prepared, and the policy of shifting assignments of individuals in order to broaden their scope of experience was again effected.

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On Z-minus-3, Commander Alvin W. Slayden, USN, of Op-36E, Lt. Colonel William S. Cowart, USAF, and Commander Thomas R. Fonick, Commander, Rear Echelon, TG-7.6, arrived aboard the BAIROKO from Washington to observe the ZEBRA shot.

ZEBRA day operations followed the same pattern of previous tests. One of the early missions, involving the land cable sample recovery, ran into difficulty when the wire cable became snagged somewhere in the vicinity of the crater. These samples were of considerable scientific value and, since it was found to be impossible to recover them by reeling in the cable by winch, a jeep was utilized and thus all but one sample was finally recovered. In the period of time involved in this mission it became apparent that the scientists and monitors assigned to the task would soon exceed the allowable radiation exposure tolerance. To meet this situation a quick on-the-spot reassignment of personnel then on shore performing other missions involving lesser radiation intensities was made. Thus the maximum amount of work was accomplished by utilizing these people to the limit of their exposure allowance.

The long narrow shape of ZEBRA island, with ZERO point located at one end, made the island survey easier than it had been on previous tests. Admiral Parsons participated in this survey which was completed on Z-plus-1 by a small party. They also collected soil samples at each blast footing for the purpose of determining the extent of contamination.

By Z-plus-1 it was apparent that the south end of ZERO island would possibly be ready for the establishment of monitor guards and

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routine RadSafe control much sooner than had been practical on previous tests. In view of this possibility an acceleration of the entire operation was foreseen.

Commander Hoffman departed on Z-plus-1 for the United States to take up his new duties as Chief of the Radiological Safety Division for the Bureau of Ships.

Crater Surveys.

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The crater involved in these radiological surveys was defined as the area surrounding the ZERO point in which variation of radiation intensities was independent of distance from ZERO. In this area it was not practical to plot the iso-intensity lines as was done on the island surveys.

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All of the surveys were completed well within the limit of exposure established for the mission. The results were very effective in completing studies of the radiation intensities on the islands.

Restriction of Islands.

Early in the operations, it was decided at a conference that as a result of radiological studies of CTG-7.6 would recommend which islands would be restricted to all personnel because of radiological intensities and which would be opened for further work and for recreation. Accordingly, as soon as possible following each test, extensive surveys were made of all islands in the atoll to determine the extent of radioactive fallout. The recommendations made as a result of this study were accepted, and provided CJTF-7 with the desired information as to safety in the lagoon. It permitted the planning of scientific missions which required working on the islands and the designation of beach and recreational facilities safe for use. The original sequence of and locations for the atomic tests were selected in advance so that the prevailing weather conditions would confine radioactivity to a progressively expanding area and at the end of the tests the islands of Parry and Eniwetok, on which the garrisons were stationed, would remain free of fallout and consequently be radiologically safe for occupation.

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Proposed Technical Report.

On 3 May CTG-7.6 dispatched a letter to the Radiological Safety Officer in which it was proposed that TG-7.6 initiate the compilation of a Technical Report on Radiological Safety at Operation SANDSTONE. It was planned that the report would be completed by AFSWP personnel currently assigned to TG-7.6 after dissolution of the Task Force, and would be in addition to all other reports presently required. Its objective would be to assist in preparing for future operations of the same nature as well as provide guidance for Radiological Defense. The proposal requested that the plan be discussed with the Scientific Director from the standpoint of feasibility and to determine its status as a Task Force or AEC document since, by its nature, the report would necessarily contain AEA Restricted Data. In order that the writing of this report, would not interfere with the writing of the Scientific Report it was proposed that the completion date of the Technical Report be 30 July 1948. It was anticipated that this report would include studies such as the following:

1. Fallout.
2. ZERO island radioactivity surveys.
3. Lagoon water survey.
4. Evaluation of crater dust hazards.
5. Effects on animal and bird life at Eniwetok.
6. Decontamination of aircraft.
7. Statistics of personnel exposure.
8. Field performance of RadSafe instruments.

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9. Evaluation of RadSafe Training.

It was planned to assign these studies to various members of the group for collection and collation of data with further analyses in AFSWP.

CHAPTER 9

TASK UNIT INTERIM REPORTS AT THE TEST SITE

Technical Measurements.

Prior to the arrival of the Task Group at Eniwetok, Lt. E. C. Vicars, USN, had flown to the test site as advance representative for Task Unit 7.6.6, arriving on 5 March. On this mission Lt. Vicars assisted in the planning for island construction necessary to accommodate installations for technical measurements projects to be carried out by TG 7.6. Meeting with representatives of TG 7.2 and the staff of General Hull, he outlined the program in detail and continued to attend the regular staff meetings of TG 7.2 as representative of TU 7.6.6. During the following period, until the arrival of the BAIROKO, Lt. Vicars made several trips to each of the ZERO islands in order to become familiar with the personnel in charge of island construction, the facilities available for use by the Technical Measurements Unit and the relation of their work to that being carried on by the Bureau of Yards and Docks and Office of the Corps of Engineers.

When the BAIROKO reached Eniwetok Atoll it was first anchored off Eniwetok Island. It was considered advisable to move all materials required for the technical measurements under TG 7.6 along with a group of operating personnel ashore on Engebi Island. This was accomplished

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within a few days after arrival.

Technical measurements being carried out under TU 7.6.6 were quite diverse in nature but in most cases relatively simple. Many measurements involved the exposure of materials on stakes driven into the ground. These included the film badges for measuring gamma radiation as a function of distance, and the heat sensitivity papers. These stakes had to be driven along two radii on Engebi and on the adjacent upwind islands. Shields consisting of steel plates and concrete blocks were fixed in position. At several stations racks were installed for the exposure of panels to measure heat sensitivity. In addition, special panels were prepared containing as many as 50 different materials consisting of papers, woods, etc., with different types of light filters in order to measure the spectral and time distribution of the optical radiation. Two test animal containers were positioned on land and two were anchored at the proper distances off shore. The heavy steel cylinders for the exposure of biological materials at close range were located at several distances.

Much of the work involved in these preparations was primarily manual labor and could have been carried out quite satisfactorily with a working party under the direction of the project officer. The enlisted complement of TG 7.6 was limited to a small number of specialized personnel required for other duties. Therefore it was necessary to obtain volunteers from the officer monitors when they were not involved in preparations for their normal duties. In future operations it appears desirable to increase the enlisted complement

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of a similar Task Unit.

One phase of the pre-test operations of TU 7.6.6 consisted of determining the sensitivity of the test materials through normal exposure of heat, humidity, and wind. The biological exposure cans were located in position and painted or covered with a variety of materials. Some were painted white, some were painted with aluminum paint, others were covered with glass wool, and still others had wooden sun-shades erected. The temperature inside these containers was measured daily with maximum and minimum thermometers and it was determined that the white paint proved the best protection from the solar radiation. The prevailing wind was of considerable assistance in keeping the containers cool. Similar studies were conducted to determine the maximum and minimum temperatures within the Yards and Docks and Corps of Engineers structures and within the land and water test animal containers. Film badges were exposed for varying periods in the sunlight to be used as controls for the badges exposed during the tests.

The two Chemical Corps projects under the cognizance of TU 7.6.6, the measurement of particle size by means of cascade impactors and the test of collective protectors for the removal of radioactive materials involved somewhat complicated installations within the OCE structures. The cascade impactors were battery operated and involved relatively simple installation, but unfortunately, in two of the structures slight alterations were required in order to attach the inlet of the cascade impactor to the one-inch pipe through the wall of the structure.

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However, installation of four cascade impactors was accomplished and the equipment operated satisfactorily.

The test of the collective protectors was somewhat more complicated since it was necessary to install some means of measuring the concentration of radioactive materials in the effluent air stream of the protector. This was to be accomplished by means of a ratemeter with a beta sensitive geiger tube in the air stream and an Esterline Angus Recorder. The collective protector was powered with a gasoline engine and the ratemeter with a gasoline driven generator. Considerable difficulty was encountered in keeping the gasoline generator operating over the full 24-hour period required as the equipment had to be started on the morning of X-Ray-minus-one day and had to operate continually until after the detonation. The generators available were small and not designed for such continuous use.

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On PETER-X-Ray a token placement of different exposure materials had been undertaken in order to test the efficiency of the methods employed. No particular problems developed as a result of this rehearsal and therefore on X-Ray-minus-four placement of materials was commenced. Previous to this the only film badges which had been installed were those located in the yards and docks structures which had to be sealed well in advance of test time. On X-Ray-minus-four the badges were placed in the Corps of Engineers structures and on the two succeeding days behind the BuShips steel and concrete shields. On

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X-Ray-minus-two the film badges and heat sensitivity materials were placed on the islands adjacent to Engebi. During this period the panels and plaques to be used for studying thermal radiation were installed and covered to prevent exposure to rain. On the morning of X-Ray-minus-one, four members of TU 7.6.6 went ashore on Engebi to place biological materials in cans, to remove covers from heat sensitive plaques and to install film badges and heat sensitive papers on exposed stakes. These materials would be used for measurement of the nuclear and thermal radiation as a function of distance. Distribution was carried out without difficulty and final preparations for test X-Ray were completed by noon on X-Ray-minus-one.

The following is a list of projects carried out under TU 7.6.6:

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Project 7.1-17/RS-1 - Gamma Radiation vs Distance

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Project 7.1-17/RS-2 - Gamma Radiation Shielding

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Project 7.1-17/RS-3 - Residual Contamination in Crater

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Project 7.1-17/RS(BA)-4 - Aerial Survey of Ground Contamination.

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Project 7.1-17/RS(BS)-5 - Exposure of Panels for Decontamination and
Heat Sensitivity Studies

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Project 7.1-17/RS-6 - Neutron Absorption

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Project 7.1-17/RS-7 - Radioactivity in the Cloud

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Project 7.1-17/RS(CC)-8 - Test of Efficiency of Field Collective
Protector

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Project 7.1-17/RS(CC)-9 - Particle Size of Material in Cloud

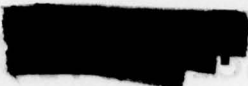
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Project 7.1-17/RS-10 - Thermal Radiation Papers

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Project 7.1-17/RS(B3 BM)-11 - Test of Crystal Dosimeters

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Project 7.1-17/RS(BM)-12 - Exposure of Biological Assay Material

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Project 7.1-17/RS(BM)-13 - Thermal Radiation Plaques

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Project 7.1-17/RS(BM)-14 - Test of Animal Containers for suitability
for exposing animals at close range.

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Between test X-Ray and test Yoke efforts were made to modify the various experiments being conducted in order to overcome some of the difficulties which developed during the first test. The most important of these was to provide some protection for the film badges in order to minimize their destruction by the intense heat and by the sand stirred up by the blast wave. This was accomplished by wrapping the badges in a layer of glass cloth and then placing a thin sheet of aluminum in front. Because of the high intensities of thermal and nuclear radiation detected during the X-Ray test additional stations were set up on adjacent islands for the placement of film badges and heat sensitive papers at greater distances. For greater protection at close range and to provide more precise data the thermal radiation plaques were in

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some cases placed behind pinhole devices and also located so that the blast pressure wave would halt the exposure.

As a replacement for the "Dead Duck" which sank prior to test X-Ray an LCM with the code name "Lame Duck" was procured through TG 7.3 for testing a field collective protector. Since both of the protectors available for Operation SANDSTONE had been destroyed in test X-Ray two additional ones, using electrically driven blowers were shipped by air from the ZI and arrived on Yoke-minus-3-day. One of these was installed upon arrival and after a 24-hour check the "Lame Duck" was anchored in position about a mile downwind from the Zero tower. In addition to the field collective protector, a cascade impactor was also placed in the LCM for the measurement of the particle size of the material falling from the cloud. Another cascade impactor was located ashore on Rujoru Island. Because of the interest shown in the particle size of the cloud material and its relationship to the problem of fallout, Colonel Cooney secured permission to place one cascade impactor in a drone plane.

No other major changes were made in the tests being carried out within TU 7.6.6 for test Yoke. Nearly all the instruments and measuring devices were in position prior to Yoke-minus-2-day and final operations were conducted without incident on the morning of Yoke-minus-1-day. The postponement of Yoke by one day necessitated the return of personnel to the "Lame Duck" to refuel the motor-generator set and reset the clocks on the cascade impactors. The heat sensitive materials in some cases required replacing because of damage by the

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frequent showers. Biological materials which might be damaged by long exposure at high temperatures were removed and replaced on the new Yoke-minus-1-day. The postponement did not have any effect on the success of the various scientific projects being carried out by TU 7.6.6.

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Following test Yoke both Captain Draeger and Commander Langer collected their materials and prepared them for shipment back to the United States for further analysis.

The Scientific Director called a meeting of all persons involved in making measurements of gamma radiation and neutron flux in order to determine whether film badges could be satisfactorily used for the measurement of gamma radiation. This meeting proved to be extremely fruitful and emphasized the desirability of frequent contacts between the various groups carrying out measurements in the same fields. As a result of this meeting several new ideas were expressed and in order to clarify certain points and obtain confirming data the measurements originally planned for the Zebra shot were slightly amplified. The steel and concrete shields which had not been scheduled for Zebra were relocated on Runit and in addition to placing film badges between the shields, packets containing sulphur, arsenic and phosphorous were inserted to measure the neutron flux. All installations for the Zebra shot were completed on Zebra-minus-2-day so that only minor checking was required on the morning of Zebra-minus-1-day. In order to hasten the collection of film badges and neutron detectors after the shot a mission was scheduled for 1400 on Zebra-day with the approval

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of the Scientific Director and Colonel Cooney.

Commander Hoffman and Lt. Vicars, accompanied by monitors, went ashore on Zero island at 1400 on Zebra-day to collect film badges, neutron detectors and heat sensitive papers. This mission was very successful and all equipment except that which was in the two stations nearest Zero point was recovered without unduly exposing members of the party to radioactivity. With a few exceptions films were in excellent condition and provided good records of gamma radiation.

On Zebra-day and Z-plus-1-day the C-47 survey plane carried out its mission obtaining excellent data which could be correlated with the surface gamma radiation measurements.

During the morning of Zebra-day one of the lagoon radiological safety patrol craft visited the "Lame Duck" and discovered that there was no evidence of recent contamination. They refueled the gasoline motor so that equipment would be operating in the event delayed fallout occurred from cloud material. Inspection of the equipment later on showed no indications of fallout and consequently no records were obtained from the collective protector or cascade impactor. Nevertheless, some film badges and one excellent sample of heat sensitive paper were recovered.

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Medical Records.

The period 15 March 1948 to 14 April 1948 was utilized by the

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Medical Records unit for the most part in reading and filing physical examination reports. Records of exposures incidental to calibration of instruments were also kept current.

On 16 March 1948 a report was submitted to CTG 7.6 showing the status of TG 7.6 personnel regarding compliance with medical record requirements. Several deficiencies in the medical records were noted, and within the next five days they were corrected. During the following two weeks action was taken to correct any deficiencies in medical records of all personnel of the Task Force. On 20 March 1948 RADSAFE Letter Number FOUR was published by CTG 7.6 to all Task Group Commanders, requesting the cooperation of all groups in completing medical requirements.

A roll-up plan for TU 7.6.5 was submitted on 21 March 1948 and subsequently approved.

On 9 April Colonel Cooney visited the BAIROKO for a conference concerning medical records. Existing records were discussed and procedures to improve them were worked out.

On X-Ray-day, film badges and monitor cards began to come in at 1200 and by 2200 over 250 were received. At 0300 on X-plus-one-day all films were processed and the over tolerance report to CJTF-7 was released. The work load on X-plus-one-day was approximately the same and the over tolerance dispatch was completed at 0400 on X-plus-two-day. Beginning on the night of X-plus-two-day the system of film processing was accelerated by segregating all dark or questionable badges and processing them first, thus permitting the completion of the over tolerance report by midnight. This system proved satisfactory

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and was continued throughout the tests.

On X-plus-five-day the Kardex file was rechecked and all over tolerance exposures were recorded. The final information on over exposures for test X-Ray was submitted on X-Ray-plus-13-day in the post shot report. Normal routine was followed in processing and reporting exposure information as work in radioactive areas continued.

On Y-plus-4-day permission was obtained from CJTF-7 to change the method of submitting over tolerance reports. Up to that date all individual exposures in excess of 100 mr/day had been reported daily. Thereafter no individual was reported by dispatch unless he received a total of more than 300 mr in 3 days. Routine records of exposure were prepared for dissemination as before.

By Y-plus-6-day the work load dropped to normal level and the Yoke post shot report was compiled and submitted to CJTF-7 on Y-plus-14-day.

Procedures used throughout the first two tests were continued for Zebra. On Z-plus-1-day a dispatch was received from CJTF-7 concerning entries on the Physical Records of all USN and USMC personnel. A conference of medical officers and CTG 7.6 devised a report form which would supply all Task Group Commanders with the necessary exposure data. It was planned to compile these reports before arrival in Pearl Harbor on the return voyage upon completion of operation at the test site.

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APPENDIX "F"

HEADQUARTERS
TASK GROUP 7.6
JOINT TASK FORCE SEVEN
U.S.S. BAIROKO (CVE-115)
Fleet Post Office
San Francisco, California

20 March 1948

RADSAFE FOUR

From: Commander, Task Group 7.6.
To : All Task Group Commanders.
Subject: Radiological Safety - Physical Examinations.
Reference: Annex J of Field Order #1 (Radiological Safety Plan).

1. Paragraph 4(a) of the reference requires that all personnel entering areas containing radioactivity or working with radioactive materials shall receive a complete physical examination including chest x-ray, blood count and urinalysis and that reports of such examinations shall be in the hands of the Radiological Safety Officer prior to departure from the United States. Such reports as have been received by the Task Force Radiological Safety Officer have been delivered to Commander Task Group 7.6 for review and recording. It is desired that reports which are late in submission be forwarded to Commander Task Group 7.6 direct who will ensure that they reach the hands of the Task Force Radiological Safety Officer as required.

2. A check of the records now on file indicates that reports of physical examination have not been received in the cases of certain persons who are believed to be subject to employment in radioactive areas. In many cases, the reports on file are incomplete and fail to

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indicate that the person successfully completed a physical examination. In other instances, the persons reported upon cannot be identified with their Task Groups or prospective assignments.

3. It is anticipated that a review of the reports, when received, will require re-examination of some personnel. It is therefore imperative that such reports be forwarded promptly. To expedite the work of checking these reports, it is requested that the eligibility lists required by paragraph 4(e) of the reference be submitted to Commander Task Group 7.6 at the earliest possible date, and that corrections be submitted two weeks prior to the test. The examination reports on hand will be checked against these eligibility lists and discrepancies will be reported by Commander Task Group 7.6 to the Task Group Commanders concerned. Eligibility lists should include full name, Task Group, and rank, grade or title. Individuals not yet present in the area should be indicated with probable date of arrival.

4. Personnel are considered to be ineligible for entry into radioactive areas or for working with radioactive materials until the requirements of paragraph 4(a) of the reference have been met.

/s/Frank I. Winant, Jr.,
/t/FRANK I. WINANT, Jr.,
Commander, U.S. Navy,
Commander, Task Group 7.6

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APPENDIX "G"

HEADQUARTERS
TASK GROUP 7.6
JOINT TASK FORCE SEVEN
U.S.S. BAIROKO (CVE-115)
Fleet Post Office
San Francisco, California

7 April 1948

RADSAFE FIVE

From: Commander, Task Group 7.6.
To : Commanders, All Task Groups.
Subject: Radiological Safety - Light-proofing of goggle housings.

1. In accordance with paragraph 3, Section I, Appendix 2 to Annex J of Field Order Number 1, neutral density 4.5 protective goggles are being issued to the Task Groups.

2. The goggles as issued are not light tight because of ventilation holes in the rubber housings. In some instances it will be found that the goggle lenses are dislodged from their rubber sockets.

3. It is requested that necessary action be taken to insure that all goggles are made light-proof by:

(a) Covering the ventilation holes with friction, rubber or adhesive tape.

(b) Carefully fitting the goggle lenses into their rubber sockets.

4. Materials used to cover the ventilation holes should be removed prior to return of the goggles to Task Group 7.6 on completion of Operation SANDSTONE.

/s/Frank I. Winant, Jr.,
/t/Frank I. WINANT, Jr.,
Commander, U.S. Navy,
Commander, Task Group 7.6

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PHASE "E"

CHAPTER 10

AIR MONITOR UNIT

INTRODUCTION

The Air Monitor Unit, Task Unit 7.6.1, arrived at Kwajalein Atoll on 17 March 1948 to participate in Operation SANDSTONE. The mission of this unit was twofold: primarily to insure the radiological safety of Air Task Group 7.4 and secondarily to obtain, compile and evaluate data likely to be of value to the AEC or Department of National Defense. This unit consisted of 24 officers and was commanded by Col Robert N. Isbell.

ACTIVITIES

Col Isbell and Lt Col Cody discussed the mission of Task Unit 7.6.1 with Lt Col Jennings, C/S of ATG 7.4, shortly after arriving at Kwajalein. Coordination and assistance on such problems as housing, messing, supply, operations and administration were agreed upon. ATG 7.4 personnel completed the erection of such installations as were required by 22 March 1948 and the Task Unit was ready for operations by 24 March 1948.

Instruments arrived on 20 March and were placed in temporary storage until a suitable storage box was constructed from an abandoned cold storage reefer. These included 50 G-M type instruments, 55 ion chamber type instruments, 150 pocket dosimeters and other auxiliary equipment including a radium source.

Projects immediately undertaken included publication of operational memoranda, assignment of monitors to mission aircraft, indoctrination

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and ground training of monitors for flying operations, construction of personnel decontamination and instrument calibration facilities, orientation and indoctrination of ATG 7.4 personnel, evaluation of instrument performance at high altitudes, photographic documentation, detailed operational planning for test days and monitor indoctrination flights.

Manned aircraft initially scheduled to participate in the air operation consisted of the following:

1 Official Observer	C-54
1 Air Command	B-29
3 Cloud tracking	B-29
3 Air-sea rescue	1-OA-10 2-PBM
1 Spotter	B-17
4 Photographic	2-C-54 2-B-29
12 Drone Mother	B-17
1 Radiological survey	C-47

However, this schedule was later revised to include two additional cloud tracking aircraft and one additional photographic aircraft. LCdr E. R. King joined the unit on 24 March to perform the radiological survey mission. Eight, unmanned drone aircraft carrying air sample filters and total range film badges were to be sent through the atomic cloud on test days to obtain air samples and measure radiation intensities.

Monitors from the air monitor unit were to accompany each manned aircraft in the test area on shot days to insure that no aircraft would

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enter an area where the radiation intensity was greater than 100 mr/hr. Other tasks in connection with the tests consisted of drone aircraft monitoring and decontamination operations at Eniwetok, aircraft monitoring and personnel decontamination operations at Kwajalein, cloud tracking operations until H plus 108 hours, instrument maintenance and recalibration operations, preparation of medical dosimetric records and compilation of mission reports.

Each monitor completed an average of two training flights with his assigned crew prior to Peter X-ray Day. The flights were extremely valuable in that each monitor was able to work out radiological safety procedures that, while adequate, would not hamper the primary mission. Instrument performance data began to be accumulated and as a result of these data considerable changes became necessary in instrumentation procedures.

Initial practice missions showed that altitudes of 10,000' or higher had a definite effect on ion chamber type instruments. In general all ion chamber instruments, except the Beckman MX-6 Gamma Survey Meter which had a sealed case, failed due to rupture of the ion chamber. This problem was solved by modification of the instruments to include an air hole in the chamber and by calibration of the instrument at the altitude for which it was to be used. Capt Matthews designed and supervised construction of an experimental instrument pressure tank which operated off the radar pressurizing system of a B-17 aircraft. Tests showed this tank to be excellent and instruments could be used in it without air calibration.

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A personnel decontamination center was constructed at Kwajalein and placed in operation prior to X-ray Day.

Problems which hampered Task Unit 7.6.1 during this phase stemmed mainly from its lack of clerical personnel and inadequate equipment, except for radiation measurement instruments. Maj Crow, Unit Supply Officer, did an outstanding job in procuring supplies and equipment from any and all sources. Clerical assistance was obtained from ATG 7.4 but was never available in adequate amounts during the entire operation.

By Peter X-ray Day the unit had mapped out radiological safety procedure aboard aircraft, was well along on the high altitude instrument calibration program, had completed operational plans for test days, was plotting radexes daily, had published pertinent mission report forms, had the personnel decontamination center at Kwajalein almost ready for operation, was well underway on the photographic documentation project and had completed the indoctrination of ATG 7.4 personnel.

PETER X-RAY DAY

This full scale dress rehearsal commenced with general and specialized briefings held at Kwajalein on Peter X-ray Day minus one. This same day at 1500 hours the drone aircraft, manned by safety crews, and four drone mother aircraft departed for Eniwetok to stage. Monitors accompanying these aircraft were completely equipped except for film badges which were not used on this mission. At Eniwetok AEC personnel installed air sample filters on the drone aircraft and three

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of the monitors simulated installation of the drone film badges. One monitor prepared the radexes. By H-4 hours all drone and mother aircraft at Eniwetok were prepared and awaiting arrival of the remaining mother aircraft from Kwajalein. Meantime, at Kwajalein, the remainder of ATG 7.4 and TU 7.6.1 were making final preparations. Radexes were completed at 2000 hours and at 2300 hours, Peter X-ray Day minus one, aircraft commenced departure for Eniwetok and the target area. Pick-up of drone aircraft at Eniwetok was completed by H-2 hours and by H hour all aircraft were on their stations. Radiological safety procedure aboard aircraft consisted of the following:

1. H-30 minutes. Instruments turned on.
2. H-5 minutes. Cabin heaters shut off and all crew members on 100% oxygen.
3. H-10 seconds. All crews adjust dark goggles.
4. After detonation. Remove goggles, observe burst phenomena and monitor watch instruments.
5. After leaving area. Monitor interior of aircraft.
6. After landing. Monitor crew and exterior of aircraft.

The rehearsal was successful in general. It was found however that ten seconds was too long a time for the pilot to be completely "in the dark" and permission was granted for the pilots, on test days, to cut a small hole in the one lens of the goggles.

The period between Peter X-ray Day and X-ray Day was devoted to preparation for X-ray Day. Complete individual mission flimsies were prepared for each monitor to use on the first test. The personnel

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decontamination center at Kwajalein was completed and adequate stocks of work clothing obtained. The high altitude instrument calibration project was completed. By 13 April preparations for X-ray Day were complete and the unit stood by awaiting implementation of the operation.

X-RAY TEST

This test was carried out in exactly the same manner and on the same time schedule as the rehearsal. Installation of drone aircraft film badges was completed at Eniwetok by 2300 hours of X-ray minus one. Aircraft were on stations at H hour and prepared for the detonations with two exceptions; the B-17 spotter aircraft which had returned to Kwajalein with a defective weather reconnaissance aircraft and the 14,000' drone aircraft which went out of control at H-2 minutes and crashed. Following the detonation all other aircraft proceeded to carry out their assigned missions without incident and without encountering appreciable radioactivity. The drone aircraft were landed at Eniwetok and all other aircraft returned to Kwajalein.

The period following X-ray Day was a very busy one. Cloud tracker missions were flown until plus five day and the aircraft used for these missions always returned with exterior contamination thereby necessitating monitoring and personnel decontamination operations. Capt Matthews and five additional monitors returned to Eniwetok on plus one day to supervise drone aircraft decontamination operations and compile data. Two monitors were sent to Guam to handle a problem which arose there in connection with weather reconnaissance aircraft contamination. Additional operations in this period consisted of post X-ray Day

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photographic aircraft missions, compilation of mission data and monitoring of drone aircraft ground maintenance operations following the return of drone aircraft to Kwajalein on X-ray Day plus five.

During a visit to Kwajalein on 24 April, Col Cooney gave an informal talk to TU 7.6.1 at which time he gave a summary of the results obtained on X-ray Day and stated some of the problems anticipated for Yoke operations.

A final critique of the X-ray test showed that the overall operation of TU 7.6.1 had been very good. The one flaw was that post X-ray Day operations were somewhat disorganized because of unexpected missions which came up. To correct this all monitors were given post mission day assignments for Yoke and Zebra tests.

YOKE TEST

Yoke test operations were carried out in the same manner and on the same approximate time schedule as for X-ray test. Several additional missions were flown in connection with the operation and TU 7.6.1 personnel were pushed to the limit of physical endurance to maintain their operations schedules.

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All operations in connection with the Yoke test were completed by Yoke plus nine and preparations were completed for the Zebra test very shortly thereafter.

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JOINT TASK FORCE SEVEN WASHINGTON DC
OPERATION SANDSTONE NUCLEAR EXPLOSIONS. ATOMIC WEAPONS TESTS. O--ETC(U)
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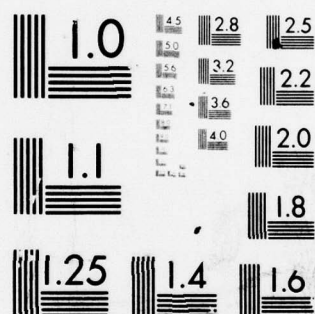
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MICROCOPY RESOLUTION TEST CHART
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ZEBRA TEST

The experience gained on the first two tests, plus the curtailment of operations for the Zebra test, made this operation a comparatively simple one. The test went off without incident. All possible data was obtained.

POST ZEBRA DAY

Col Isbell departed for Hawaii on Zebra plus two to participate on the Task Force Awards Board and Lt Col Cody assumed command of the unit.

On Zebra plus one roll-up of the unit began. Three monitors departed for the ZI on emergency leave. Final missions were completed and equipment turned in.

In a memorandum from CTG 7.6, dated 12 May 1948, to CJTF SEVEN, approved and forwarded by Col Cooney concerning radiological safety measures in connection with the return of drone aircraft to the ZI, the following recommendations were made:

1. The responsibility of CTG 7.6 in connection with the radiological safety of these aircraft be terminated upon their arrival at their home base in the ZI.

2. Proceedings be initiated by Commander, Air Forces, to insure that the home base of these aircraft have necessary RadSafe personnel on duty.

It was decided that the drone aircraft would be cleared for return to the ZI when radioactive contamination had decayed below a intensity. Four monitors from TU 7.6.1; Lt Col Proctor, Capt Nash,

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Capt Land and 1st Lt Buchanan, were detailed to remain and accompany these aircraft back to Eglin Field, Florida.

On Zebra plus four the remainder of TU 7.6.1 departed from Kwajalein for Eniwetok. On Zebra plus five the unit rejoined their parent organization, TG 7.6, aboard the U.S.S. BAIROKO for the return voyage to the United States.

CHAPTER 11

ROLL-UP

General.

Following the ZEBRA test the RadSafe program at the test site became somewhat accelerated since work similar to that following previous tests had to be conducted in conjunction with RadSafe roll-up operations.

By ZEBRA-plus-4 the collection of test materials and survey data at the ZEBRA site was completed, and on this date the BAIROKO shifted anchorage to join the main task force off Eniwetok Island.

Meanwhile on ZEBRA-plus-2 and 3 a RadSafe survey of Eniwetok Atoll was conducted in conjunction with the final Radiological Status Report.

The Radiological Status Report of Eniwetok Atoll was submitted on ZEBRA-plus-5 to CJTF-7 and a copy furnished the Post-SANDSTONE Garrison Commander.

During this same period another survey was made of all ships present for the purpose of establishing radiological clearance for

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vessels and boats prior to their departure for the United States. Results of this survey indicated eligibility of these ships for final clearance, although certain of the blower intake screens read up to normal tolerance which persisted at lower intensities after repeated scrubbing. It was suggested that the inlet screens to supply blowers, where these intensities were indicated, be scraped to the bare metal, repainted and monitored again upon arrival at a Navy Yard. The Radiological Safety Officer concurred in the findings of this report and stated that there was no radioactive hazard to personnel on any ship.

On 20 May all operations at Eniwetok Atoll under surveillance of TG-7.6 had been completed, and it was recommended that the responsibility for radiological safety of the area be transferred to the Commander, Eniwetok Atoll. Captain Meredith Mallory, Jr., MC, USA, of this Task Group was left at Eniwetok as acting Post Surgeon and Radiological Safety Officer until arrival of the officer assigned this billet about 1 June 1948.

On 21 May the BAIROKO departed from Eniwetok Atoll with the main Task Force convoy bound for Pearl Harbor and the United States. During this voyage all data and notes taken during operations were reviewed and extraneous material destroyed. Files were prepared for shipment by courier or registered mail from Oakland to AFSWP in Washington, D. C.

Personnel.

As indicated in a previous phase of this report, several members of TG-7.6 had already departed for the United States prior to Test

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ZEBRA. On ZEBRA-plus-1 Lt. Colonel Cowart departed for Washington, D. C., followed by Dr. Scoville and Major Moss the next day. By ZEBRA-plus-five many of the monitors and civilian personnel had departed for the ZI.

The Air Monitor Unit closed out operations at Kwajalein and all personnel who were to make the return voyage on the BAIROKO were aboard by ZEBRA-plus-5.

On the day before sailing, Colonel Cooney and YNC Harmon transferred to the BAIROKO from the MT. MC KINLEY.

On 21 May when the BAIROKO sailed for Pearl Harbor the total personnel of TG-7.6 aboard consisted of 36 officers and 18 enlisted men.

When the Task Force arrived at Pearl Harbor on 27 May Colonel Cooney, Commander Winant, Lt. Colonel Houghton, Major McDonnel, Captain Bolen, Lt(jg) Babcock, YNC Croasdell and YNC Smiley debarked from the BAIROKO to attend to various administrative matters in the roll-up of operations. Lt. Commander Oldfield was also transferred at this time to his permanent duty station at Pearl Harbor.

The balance of TG-7.6 personnel remained aboard the BAIROKO on its trip to San Francisco. It is planned that the Task Group will dissolve on 28 May 1948 and that personnel will be released from the Task Force upon arrival at their respective permanent duty stations. Lt. Commander Campbell will remain at Oakland about one week to supervise disposition of TG-7.6 materiel. Also at Oakland Major Stone will assume custody of all files and other classified data of the Task Group to be shipped to Washington, D. C.

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Enroute to Pearl Harbor Lt. Commander Campbell assisted in the preparation of a memorandum to CJTF-7 from CTG-7.6 in reply to a previously issued directive from the Task Force Commander on the subject: "Requirements for Future Atomic Tests". This memorandum was to include personnel, materiel and logistic requirements to be used as a guide for any similar operations in the future.

On ZEBRA-plus-6 the supply section began taking up the individual equipment of the remaining members of the Task Group. This equipment, along with other materiel was packed and marked for shipment while enroute to the United States. All instruments were packed and crated in special shipping boxes built to specifications for their shipment.

In addition to the instruments left for the Post-SANDSTONE Garrison others were left to be used in monitoring the drone planes on their return flight to the ZI. These were as follows:

- 2 MX-6 Instruments
- 6 263A Instruments
- 2 Charging Boxes for Kelly-Koett dosimeters
- 24 Kelly-Koett, O.2r dosimeters.

Upon the arrival of the drones at Eglin Air Force Base, Florida, the instruments will be packed and shipped to the Scientific Laboratory at Los Alamos in accordance with instructions received from the AEC, where they will be received by Mr. H. S. Allen.

Attached as Appendix "H" to this report is a copy of a memorandum from Mr. Adrian H. Dahl to CTG-7.6, attention Lt. Commander Campbell,

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dated 3 May 1948, subject: "Packaging and Shipping Requirements for RadSafe Instruments". It was Mr. Dahl's recommendation that a quantity of instruments be held in stock at Los Alamos. In considering the list of instruments for shipment to Los Alamos he endeavored to list only those instruments which had proven to be of field use. Those classes of equipment which proved to be of no great merit for field use or which require further development would be returned to Oak Ridge. Only equipment which he felt reasonably certain would be on hand at Oak Ridge as sufficient surplus stock by 16 June, excluding the TG-7.6 RadSafe instruments, was included to go to Los Alamos. Laboratory equipment such as scalers and count rate meters would be returned to Oak Ridge. Mr. Dahl recommended that facilities be established to keep the Los Alamos stock in operating condition. If at any time an emergency arises in the AEC where the Los Alamos stock instruments are required elsewhere, a written request for transfer will be issued by him from Oak Ridge. Such a request will be made only in cases of emergencies.

Instruments which had been obtained from BuShips are to be returned to Dr. H. Friedman at the Naval Research Laboratory at Anacostia, D. C. One instrument will be returned to the Naval Damage Control School, Radiological Safety Division, Treasure Island, California. Certain other materials from the service tests will be returned to the Radiation Laboratory, Hunter's Point Naval Shipyard, San Francisco, California, the Naval Research Institute, Bethesda, Maryland, and to the AFSWP, Washington, D. C. At present, no information has been received on the disposition of radium sources but instructions concerning their ultimate

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destination will undoubtedly be received upon reaching the United States.

All excess clothing and miscellaneous impedimenta will be turned over to the AEC at Oakland, California, for disposal. The bulk of the instruments employed in the operation will be sent either to the Instrument Branch at Oak Ridge, Tennessee or to the Los Alamos Scientific Laboratories, New Mexico. Some of the laboratory equipment will be sent to the National Institute of Health, Bethesda, Maryland, for use by Commander Andrews in continuing his work.

An estimate of about one week was given as the time requirements for closing out all supply shipment and logistics problems after arrival at Oakland, California.

Technical Measurements.

The roll-up operations for the Technical Measurements Unit (TU-7.6.6) were extremely simple in nature since little expensive equipment was involved. All films and thermal radiation measuring devices were shipped to the United States by air.

The test animal containers which were last used on Aoman Island were removed to the lagoon and sunk. Laboratory counting of the crater samples and other radioactive materials will be continued on the BAIROKO until just prior to arrival at the United States. Some of those samples which were sufficiently radioactive and of particular interest will be shipped to the National Institute of Health for the use of Commander Andrews in

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continuing his work. The slides from the cascade impactors will be taken by Lt. Commander Campbell to the Army Chemical Center, Edgewood, Maryland, for measurement of particle size with an electron microscope under the direction of Mr. Lanier.

A large amount of data was obtained from the projects conducted by the Technical Measurements Unit, and only after much work will its true significance be recognized. Various project officers will continue with the writing of reports at their respective stations, and these reports will be submitted to the Scientific Director by 30 July 1948.

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ANNEX I

Notes on Operations

Aerial Crater Survey-Radsafe Party No. 1

The C-47 with monitor took off from Eniwetok 30 minutes following the test.

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Phase one consisted of flights over the crater at various altitudes in order to determine the radiation intensity above the crater. It was flown at heights up to 5,000 feet during this survey, readings were radioed in code to the USS MT MCKINLEY whenever the plane crossed an active area, Phase III included a check of the islands to the west of the test island at an altitude of 200 feet.

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Phase II, a check of the air over the crater at 5,000 to 10,000 feet elevation, was then begun.

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A further survey was made on X-RAY-plus 1, followed by a recheck on X-RAY-plus 6, at which time the ground monitors were also surveying the crater. Final analysis of these data is awaiting study of the decay curves, but it appears that excellent results were obtained.

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Eniwetok Island - Radsafe Party No. 2

The radsafe party in Eniwetok Island consisted of Captain Mallory and two assistants. The first members of this party arrived on Eniwetok Island, 30 March. A radiological safety center was established in the radiochemistry laboratory. This location was in close proximity to the drone parking area and proved to be ideal for the mission at hand. A TCS radio was installed by the Island Commander's communications office and continual watch was kept on this circuit with the Radsafe Center on the MT MCKINLEY and Radops on the BAIROKO. Complete rehearsals were held on PETER X-RAY Day with the drone landings and it was estimated that two monitors could handle the filter removal operation.

At 0725 following the shot the first drone plane landed. The drone planes were not parked together. This caused some confusion and it was very difficult for the monitors to keep in contact with all the personnel involved. However, by 1000 the top filters were unloaded and on their way to the states.

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Washing down and decontamination of the drones was accomplished by the air monitors. The washing was completed by the morning of X-RAY-plus 3.

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Tank-LCM Operations - Radsafe Party No. 6

The purpose of the Tank-LCM operation was to procure a soil sample from the crater at the point of detonation of the atomic weapon. A tank revetment was built on each of the test islands located as far as possible from the zero point. In this revetment the chassis of a light tank, brilliantly painted for easy visibility, was concealed at the time of the test. It was equipped with remote controls which permitted the vehicle to move either right, left, or forward. It was also fitted with a scoop in front for the purpose of lifting up a sample of the soil. When obtained this sample was divided into two parts, the smaller part was taken to the laboratory on board the USS BAIROKO, and the other to Eniwetok where it was loaded on aircraft and flown to the Los Alamos laboratories in the United States.

The tank was operated by remote control from a helicopter, after its operation had been checked by a ground operator, and it was guided by this means to the crater and return. If, for any reason, the helicopter and its standby lost control, the tank operation could be taken over by an auxiliary set of control equipment in the LCM which brought the party to the island. The LCM also carried an additional tank for use if the first tank failed.

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The monitors assigned to this mission on X-RAY Day were LCDR Vandergrift and LT. Woy. Dr. Bowman, who was in charge of the mission, and Mr. Stanley, his assistant, remained behind on Eniwetok completing the drone filter removal, as the Tank LCM took off for the test island. The LCM picked up the monitors from the BAIROKO and beached at the lower end of the island not far from the Tank Revetment. No damage had been done to the tank by the blast other than loss of the antenna. This was replaced, the tank was started and driven out of the revetment to await the arrival of Dr. Bowman and Mr. Stanley by helicopter. Upon his arrival at 1110, the tank controlling helicopter was called from the BAIROKO, and Dr. Bowman accompanied by LCDR Vandergrift proceeded by jeep to lay out the flag markers, beyond which it would be unsafe for the tank controlling helicopter to fly.

The tank performed well, and made two runs with samples which were considered too low in intensity. On the third attempt the tank was stalled in the crater and could not be moved by remote control. The reserve tank could not be used because it was now minus its radio antenna which it had sacrificed for the first tank.

The first sample was taken for study, and divided. The first part arrived with LCDR Vandergrift at the BAIROKO at 1330, and the second arrived at Eniwetok with LT. Woy by 1740. The party became contaminated to some extent and arrangements were made to clear this party at Eniwetok.

The tank control operator was subject to some exposure, and to

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protect this operation a second helicopter containing a monitor was dispatched to accompany and remain forward of the operating plane.

Helicopter Operation - Radsafe Party No. 7

This mission consisted of the dispatch, by helicopter, of members of the LAJ-3 group to the land cable on the test island, in order to assist in the recovery of samples. It was essential that certain of the samples on the land cable be recovered as quickly as possible in order to take proper technical measurements. Winding the cable on to the drum of the winch took considerable time, and starting the drum promptly saved time for the AVR party which later came to the island to complete the collection of the samples.

A monitor was sent as monitor for this party to accompany Dr. Ogle and his assistants. The duties of the monitor included the clearing of the landing for the other helicopters, standing by while the winch was started, going forward along the cable in a jeep with Dr. Ogle to recover samples near the zero point and later opening up the cache and starting the radio communication.

Three helicopters were used. It was found after X-RAY Day that the operation would be facilitated if six men were sent in on this operation, accompanied by two monitors, and this procedure was followed on succeeding tests.

On X-RAY Day, a monitor cleared the landing of the other planes, and went to the cache

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Several of the samples were missing from the cable as

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it was wound in, and Dr. Ogle with the monitor went forward to locate these samples. The mission was accomplished in less than two hours

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The monitor

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then returned to the AVR and accompanied an unscheduled water cable party. No samples were found either afloat or on the bottom of the lagoon, as far as could be seen. Since the party went quite close to the zero point in the water, considerably more exposure was the result. However, the total received was well within the tolerance established. More of the missing samples were recovered in later trips to the island.

Strategic Plot Center

STRATEGIC PLOT maintained a fall-out chart of the lagoon,

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The Eniwetok atoll chart

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was kept up to date as reports came in and an iso-intensity line of 0.1 r per day in the lagoon water was also plotted on this chart.

The surface and air radexes were plotted daily from weather data obtained from Aerology. Utilizing a vector analysis of the wind velocities, fall-out patterns for the surface, 15,000, 20,000, 25,000 and 30,000 feet were determined. These patterns were plotted on charts with a superimposed polar grid. From the fall-out patterns, the surface radex, given as two bearings from zero point, and also recommendations as to the direction of the third pass for each drone plane mother were determined.

Definite criteria were used to determine whether or not the

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day was operational from a radiological safety viewpoint. If the fall-out from 45,000 feet or below did not extend between 90°T or 170°T from zero point, the day was considered operational. If the fall-out from 45,000 feet fell on the bearing of Eniwetok-Parry islands (150°-160°) the day was considered questionable with moderate hazard. If the fall-out from 35,000 feet or below fell on these islands, the day was considered non-operational.

Three days preceding the test a forecast for a test day was made, and on the day before the test day the latest weather forecast was presented at 1800. Actual wind data was plotted at intervals from this time to 0300 at which time the last balloon sounding was made and the data was prepared for the briefing.

X- RAY-Plus-Two - YOKE Test

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A consoli-

dated report was prepared and all the evidences of fall-out noted during the days following the test.

On X-RAY-plus 5, Commander Task Group 7.6 sent a report to Commander Joint Task Force 7 stating that the survey of all the perimeter islands had been completed,

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Dust collectors had been set up on each of the principal ships of the Task Force, and were examined daily, together with a careful check of the evaporators.

Several surveys were made on the test island and the gradual retreat of the iso-intensity lines was plotted in Radop.

On the fifth day after the test, a guard of two monitors each morning and afternoon was set up on the test island, and the Beach Radsafe Center established. This made the island more accessible to the engineers who were to work on the portion where the intensity of radiation was now below tolerance limits. It considerably reduced the monitor demand on Task Group 7.6, and at the same time insured a closer watch on the many parties that had mission on the test island.

The bogged tank was recovered from the crater, and work was begun by the engineers to destroy the remains of the test structures on the island in order to prevent any unauthorized persons from obtaining any information on the effects of the tests.

On X-RAY-plus 9 the USS BAIROKO shifted its anchorage to a location off the test island for YOKE Day, and final preparations for YOKE test were well underway. Two days later the island of X-RAY test was closed to all personnel.

Preparation for YOKE Test

Installation of stakes, and the painting of numbers on various structures of the test island facilitated island surveys. Three stakes at hundred yard intervals were placed on the island immediately

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to the north of the zero point for use in any surveys that might be made in this direction. The stakes on the test islands were not located on a systematic radial manner from the zero point as was the case in test X-RAY, because the engineer structures were located in a cleared strip extending along the lagoon side of the islands and about 300 yards wide. It was planned to ignore, for all practical purposes, the extensive palm grove on the portion of the island toward the ocean, and which was expected to become a mass of tangled rubble as a result of the test. All of the island survey monitors were thoroughly briefed.

Because of the evidence of fall-out from the X- RAY test, it was decided by higher authority to maintain monitors on the destroyer patrols until YOKE-plus 4. Accordingly a monitor was assigned to each of the following destroyers:

USS TUCKER (DDR 875)

USS SPANGLER (DE 696)

USS GEORGE (DE 697)

YOKE Day

A cloud resulting from the explosion of the atomic weapon was still plainly evident thousands of feet above the zero island when the four helicopters came in on the southern tip of the island for a landing. The landing was made about twenty minutes after H hour. Major Cook in a jeep with Dr. Ogle and Mr. Linnenberger went along the land cable to assist in recovering the samples at various

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points along it. Major Sheppard stayed with the remainder of the party in the vicinity of the winch. All but 100 yards of the cable was recovered with all of the samples except two of the multiple samples.

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This material was removed to a safe distance from the operation. Major Cook crossed the causeway with Dr. Ogle, approaching the zero point to a predetermined reading of **DELETED** and returned. The mission was entirely successful, all members of the party taking proper precautions in handling the samples with gloves and tongs, and no overexposures were obtained.

Major McDonnell's party landed about twenty minutes behind the helicopters, beaching on the island by an LCVP that had been picked up by the AVR. The missions at Gamma "A" and Gamma "B" station were completed satisfactorily although at Gamma "A" station the roller tracks were wedged and the party at this station received some contamination on their clothing while forcing an entrance. A camera placed on the causeway was recovered. All of the personnel returned on the AVR 38, and were checked for contamination on boarding the USS BAIROKO. Meanwhile the samples had been flown by helicopter to the laboratories on the USS ALBEMARLE for final analyses. The entire

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operation was completed earlier and more efficiently than in test X-RAY.

Following the test, the USS BAIROKO weighed anchor and was proceeding slowly to its anchorage off the test island, preceded by four boats patrolling the lagoon waters ahead of the ship. Two other boats preceded the rest of the JTF 7 fleet to their anchorage off the island to be used for test ZEBRA. These boats were tracked and plotted by radar and the readings of radiation intensities in the water were transmitted in code to the Radsafe Center and to Radops on the BAIROKO. Iso-intensity lines of water contamination in the lagoon between the anchorage and the test islands were plotted for the information of the Task Force Radiological Safety Officer.

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The survey of the test crater from the air was begun by LCDR King in a C-47, but

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At H-plus 3 hours two monitors boarded the Tank LCM as it came

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by the BAIROKO and proceeded to the zero island to await Dr. Bowman who was to fly to the island by helicopter after supervising the removal of filters from the drone planes at Eniwetok. Dr. Bowman arrived at 1050, and flags were placed at the center of the causeway marking the limit of safety for the tank controlling helicopter. The helicopter in which the tank operator, was riding was forced down by engine trouble on another island, and caused some delay before he could be flown in for the operation. At 1130 the operation was ready. The tank that had been stationed in the revetment during the test was driven manually to the causeway, and from thence proceeded under remote control operation to the crater formed by the test weapon. The tank soon became bogged down, and efforts to get it started again were unavailing. The reserve tank that had been brought up in the LCM was then sent in and successfully obtained a soil sample from the desired point, returning to the uncontaminated end of the island. This soil sample was divided, a small portion being sent to the laboratories on the USS BAIROKO, and the remainder being taken to Eniwetok by one of the monitors. This latter sample reached Eniwetok by 1510 and was dispatched by air to laboratories in the United States.

During this entire operation a standby helicopter with a monitor took up a position near the tank controlling helicopter, in order to insure that the latter would not be overexposed to radioactivity. When this plane landed to investigate the trouble with

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the tank, the monitor in the other helicopter checked most of the island at an altitude of 500 feet, except that portion in the vicinity of the zero point.

The evaporators on the BAIKORO and on the MT MCKINLEY were checked for radioactivity and found satisfactory.

YOKE Plus Two Day

The northeast perimeter survey of the islands left the BAIROKO at 0930 in two dukws.

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All results were reported in detail to Radops where a complete fall-out report was prepared.

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Hourly samples of

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filter papers from the dust collectors were taken throughout the day, and studies of beta count made in the laboratory, a cascade impactor was operated at the same time.

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No contamination was detected in the showers of rain that fell through the day.

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Negligible contamination was found in the evaporators which were being checked daily.

YOKE Plus Three Day to ZEBRA Test

The contamination of the lagoon waters had reached an insignificant figure by YOKE-plus 3 day, and further survey of the lagoon anchorage, other than an occasional spot check, was discontinued. The islands of Runit, Parry and Eniwetok were cleared for swimming and recreation parties.

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Monitor guards were established on Yoke-plus-4, and maintained continuously until the island was closed just prior to ZEBRA test. Their presence considerably facilitated the work of the engineers in clearing evidence of blast effects from the island.

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The island of YOKE test was closed and declared a restricted area on YOKE-plus-11. Reconnaissance on the island of ZEBRA test, and the survey of lagoon currents off this island had already begun.

ZEBRA Test

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RadSafe Party No. 4 ran into considerable difficulty on their mission, because snagging of the land cable made it impossible to wind the samples in to a safe area where they could be conveniently handled. The importance of obtaining these samples made it necessary to pick them up by jeep, which exposed the party to considerably greater radioactivity than had been met on previous missions. Rotation of the

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working personnel resulted in getting the most work accomplished within the exposure allowed, and this reassignment was made smoothly and without confusion.

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On the LCM Tank Mission, Radsafe Party No. 6, the first tank became stalled near the zero point, but the reserve tank successfully the desired samples.

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The top filter boxes were removed from the drones, but it was considered more efficient in the case of the bottom filter boxes to remove the filter paper holders without removing the boxes from the planes. Gloves and 18" tongs were used for this operation, although a stapling machine was used to mark the papers. The monitors kept the handling personnel advised of the intensities at all times.

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It was recommended that more remote methods of handling filters for future tests be devised.

On ZEBRA-plus 3 days all of the ships of the task force in the lagoon were inspected by monitoring parties. These groups paid particular attention to the blower intake screens, the open decks, the ship's boats, the evaporators, the auxiliary condensers and any cargo that the ship happened to have on board.

All monitoring operations ceased after ZEBRA-plus 5, and the test island was declared closed. Captain Mallory was assigned to remain at Eniwetok Island until relieved by the permanently assigned garrison minitor.

Monitor Schedules.

Copies of Monitor Schedules for Operation SANDSTONE are appended to this ANNEX as Appendix (1)

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REPORT OF COMMANDER TASK GROUP 7.7

1. In compliance with instructions, the following report of the operations of Task Group 7.7 (Island Command, Kwajalein) is submitted:

(a) Plans and Organization.

The initiation of Sandstone occurred at a very difficult time for the Kwajalein Island Command. During the two years since the end of hostilities, all buildings on the island (which are exclusively temporary wartime structures), and all equipment had deteriorated badly, deterioration being accelerated by the viciously corrosive atmospheric conditions of this locality. The Crossroads Operation had added to the jumble of temporary installations, and much accumulated equipment of the war and of Crossroads remained, mostly in an unusable condition. Shortage of manpower had prevented any proper roll-up or even inventory after Crossroads. Lack of a firm decision as to the future status of the island had delayed any corrective measures until September, 1947. At that time, a complete rehabilitation program for the island was initiated, and personnel, funds and material allocated for the purpose. This program was just getting underway in October, when the first tentative information concerning Sandstone was received. The situation was further aggravated by the unfortunate death of Commodore G. A. Seitz, USN, the Island Commander, on 23 October.

Against this background, plans were developed progressively as

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additional information was received. Field Order No. 1 assigned to the Island Commander (CTG 7.7) full responsibility for the provision of housing, operational facilities, utilities and basic logistic support for all JTF units basing on Kwajalein. The task was essentially that of providing support for the Air Task Group 7.4. A detachment of the 926th Engineer Aviation Group under Colonel Keith R. Barney, USA, was assigned to assist with the necessary construction work. This detachment was designated Task Unit 7.7.4. Until 19 December Colonel Barney remained at Oahu, conferring with JTF Forward on plans and specific requirements, and assembling and forwarding construction materials.

(b) Development and Completion of Details of Plan.

A considerable portion of the planned rehabilitation program on Kwajalein consisted of work to be performed by the Byrne Organization under Navy Contract NOy 13950. The work consisted largely of the renovation or replacement of utilities facilities -- water and sewage lines, electric power lines, fuel lines and tanks, etc. In order to meet the urgent requirements of Sandstone, this contract was extended in some respects, and established priorities were radically revised, to give highest preference to installations required for Task Force use.

Sandstone activities greatly increased the amount of shipping to be handled at Kwajalein. The loading and off-loading of these ships placed a heavy load on naval personnel on the island, which threatened to interfere with the necessary construction work. This situation was partly relieved in January with the arrival of a detachment of 60 Port

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Company Stevedores, later increased to 100, assigned by CJTF-7.

When the choice of Eniwetok as the site of the operation became known, it was evident that the native Marshallese population of Eniwetok must be re-located elsewhere. This task fell to the Governor of the Marshall Islands, who is also Island Commander, Kwajalein. Ujelang Atoll, lying about 125 miles southwest of Eniwetok, was selected, and on 22 November a SeaBee working party from Kwajalein moved into Ujelang and commenced construction of basic facilities -- catchments, cisterns, latrines, tent-frames, etc. Ujelang was then an uninhabited but comparatively rich and fruitful atoll, its lack of population being due to the fact that the Germans had removed all the inhabitants and transformed the main island into a commercial coconut (copra) plantation, and the Japanese continued this arrangement. Before the move could be initiated, it was of course necessary to obtain the assent and agreement of the Eniwetok people, but until the first announcement of the operation was released, it was not possible to broach the subject to them. This caused some concern, since a deadline date of 30 December had been set to complete evacuation and start construction on Aomom and Biijiri Islands, and it was desired to avoid undue precipitation. On 3 December, immediately after the first public announcement of the project, the Governor met with the Eniwetok council, outlining the circumstances and asking their agreement to the move to Ujelang. After a series of discussions over a period of a week, and a visit to Ujelang by the two chiefs

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and several members of the council (alaps), the move was agreed to, and was actually effected on 21 December. Without going into the many details of this move, and with full appreciation of the many difficult factors involved in the uprooting and transplanting of an entire community, it is confidently believed that the move has been successful, and that the condition of these people will have been bettered rather than worsened in the long run.

(c) Continuation of Development and Completion of Plan.

16 February - 15 March.

During this period, construction was continued according to plan, the only deviations being those necessary to deal with unforeseen and new requirements which arose. These last-minute additions, which are normally inseparable from an operation of this size planned under pressure of time, were chiefly embarrassing because of lack of excess construction materials. Situated on the end of a long supply line, as Kwajalein is, this lack, and the time required to fill a requisition, is always a critical factor. In this case, since Sandstone was operating within a very tight time schedule, there was no alternative save to divert to Task Force use available material from other island projects. This was done.

The period 1 - 10 March was a critical one for the port of Kwajalein. Shipping to be handled reached a peak, and the limited port facilities were taxed to the limit. To handle the load, all personnel were placed on a 24-hour, 3-shift basis. The Island Commander, Eniwetok, furnished 35 additional stevedores to assist

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with the Yancey. All ships were off-loaded and sailed on time.

(d) Operations at Site.

Task Group 7.7 had little or no participation in these operations. The principal effort of this Group was completed prior to 1 April, when all preparations to base and support the Air Task Group were accomplished. Thereafter, the task was merely logistic support, which was rendered without unusual difficulty.

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(c) Roll-up.

As the mission of Task Group 7.7 was essentially the support of Task Group 7.4, so the problem of roll-up consisted mainly of supporting and assisting the roll-up of 7.4. The matter of an adequate and completed roll-up is a question of vital concern to the Island Commander. The failure to carry out such a roll-up after the Crossroads Operation has greatly aggravated the difficulties of the Island Command since that operation, and has served as an object lesson. The normal garrison of the island is barely adequate to carry out the routine missions; the urgent rehabilitation program puts a heavy additional load on these personnel; any uncompleted roll-up of Task Force structures, equipment, etc., not fully accomplished prior to departure of Task Force personnel, would completely disrupt the island program for a long period. As of this writing the roll-up has not been completed, but is proceeding in a satisfactory manner. Commander Task Group 7.4, assisted by a small engineer detachment from Task Group 7.2, is proceeding with the schedule of requirements set up in agreement with Commander Task Group 7.7, and it is currently estimated that all work, including final loading of USS WARRICK, will be completed prior to 3 June, five days ahead of schedule.

2. Comments and Recommendations.

(a) Command Relations.

From the viewpoint of the Island Commander (CTG 7.7) the Task

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Group command relations were highly satisfactory. The chain of command and assignment of responsibilities established by Commander Task Force were clearly defined and logical, and there was little room for any misunderstandings or confusion. At the request of the Island Commander he was issued orders by Commander in Chief, U. S. Pacific Fleet, directing him to report to Commander, Joint Task Force 7 for additional duty. Upon his reporting, CJTF-7 issued a Letter of Instructions which gave him ample authority to carry out his task. Relations with all other elements of the Task Force were smooth, effective and pleasant.

(b) Control of Air Operations.

One aspect of the Operation which was not completely nor satisfactorily covered by Field Order No. 1, nor by other existing instructions, was the question of control of air operations in the Kwajalein area. While it was clearly necessary that CTG 7.4 should have control ample to enable him to carry out his air tasks, it did not seem desirable from any viewpoint that he should be burdened with operation of the routine local and airways control normally exercised by the Island Commander, and which continued throughout, but with no relation to, the Task Force. At the same time it was necessary to avoid the hazards which would inevitably arise from a divided control of the airdrome, the local control area or the airways. A joint agreement was worked out between CTG 7.4 and CTG 7.7 and approved by CJTF-7. It proved entirely satisfactory

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and remained in effect without change during the whole operation. It is recommended as a basis for any future operations of this nature.

(c) Recommendations for Future Operations

These recommendations have been submitted separately to Commander-in-Chief, Pacific, at his direction. It is understood that he will coordinate all recommendations from naval commanders, and forward combined recommendation to Commander, Joint Task Force 7.

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